



## JOURNAL

MAY

1893.

OF THE

# MILITARY SERVICE INSTITUTION

WILLIAM L. HASKIN,  
Editor First Part.

Authors alone are re-  
sponsible for opinions  
published in the Journal.

JAMES C. BUSH,  
Editor Second Part.

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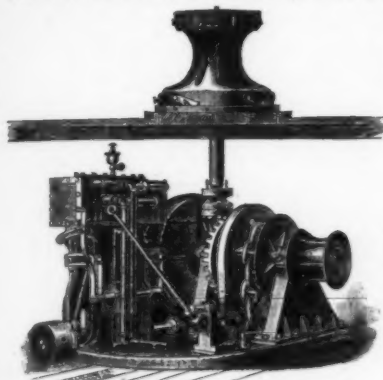


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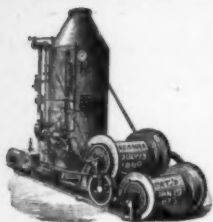
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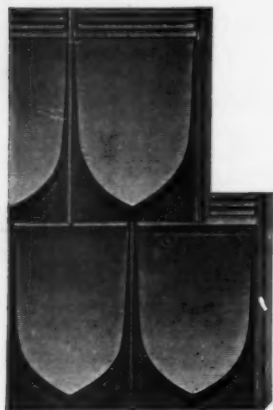
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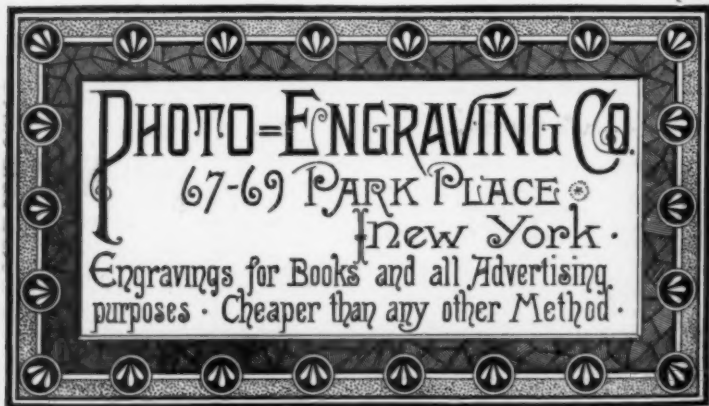
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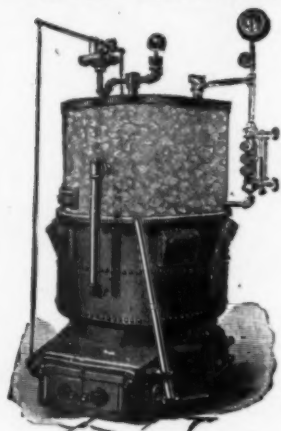
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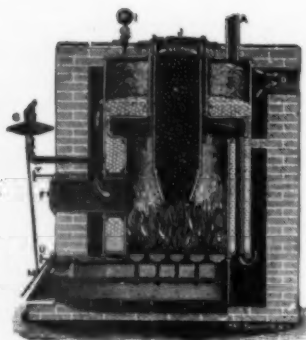
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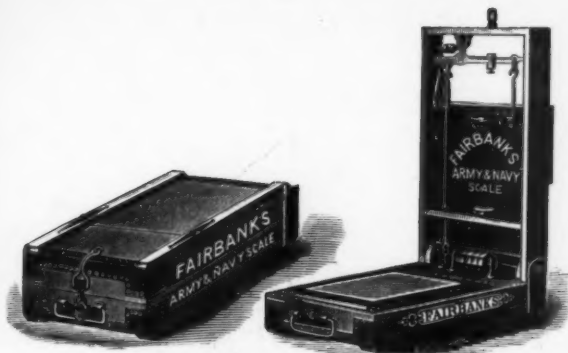
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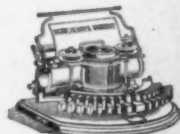
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*"I cannot help plead to my countrymen, at every opportunity, to cherish all that is manly and noble in the military profession, because Peace is enervating and no man is wise enough to foretell when soldiers may be in demand again."*—SHERMAN.

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THE EVOLUTION OF MODERN DRILL BOOKS.

BY CAPTAIN F. N. MAUDE (LATE R. E.).

(Continued from JOURNAL No. 62.)

HAVING traced the evolution of the present German system of tactics in the above, I have now to notice how and where our own British system has diverged from them. This point is of special importance in America, for from what I have gathered by conversation with American officers and from reading contemporary American military literature, it seems to me that a very false impression of the prevailing tendency in Germany has come to them through our tactical books and papers. The subject too is of interest, as it shows how inexorably any defect in organization ultimately avenges itself by retarding or distorting the course of evolution. It happens that at the period of the Franco-German war, and immediately anterior to it, there were some unusual factors active in our army which exercised an influence which has not yet been sufficiently investigated, but which supply us with a key to the extraordinary mental aberration from which our latest infantry regulations show that we are still suffering. Our army was then a long-service one, and though no sane man can deny the superiority of a force of veterans grown old in normal warfare, things are very different in a force of which only a part has seen active service, and that active service not

only at a relatively remote period of time, but under conditions anything but normal.

The Crimean war was no school of training for field operations. The Sikh wars of '48, '49, and the Indian Mutiny, from the nature of the enemy and the natural features of the country in which they were fought, afforded us little guidance as to modern European tactics. They were all useful in so far as they accustomed both men and officers to battle, murder and sudden death, but this very acquaintance with the realities of war and the tremendous responsibilities involved, acted disadvantageously in two directions.

Amongst the junior ranks and the men, it encouraged a feeling of extreme conservatism, and amongst the seniors on whom responsibility ultimately would rest and who were compelled to give thought to the matter, an uncomfortable feeling that their experience would not help them much in presence of such a totally new factor as the breech-loader was reported to be.

Again, at the conclusion of both the Crimea and the Mutiny the regiments were largely reduced, recruiting was checked, the oldest men eliminated and the pick of the whole, men about the same age and all with a couple of medals, were retained: finer regiments were probably never seen, but they contained in them the germs of their own decay.

For unfortunately the men all grew old together. Having been trained in war, they knew about all there was for them to know, and a couple of commanding officers' parades a week were sufficient to keep them in order: the rest of the time they were idle. The very few recruits could safely be left to the adjutant and sergeant-major. The regimental organization, accustomed to the friction of war, worked like well-lubricated machinery in time of peace, and the colonel found it possible and easy to manage everything himself.

Now I believe it to be a characteristic of the Anglo-Saxon race, that no men are more greedy of power and responsibility; but the great majority do not understand that the way to rule is, never to do anything yourself that you can possibly get done for you, but content yourself with exercising a general superintendence. Mark Twain's Tom Sawyer, when he got all the other small boys to lime-wash the fence whilst he himself looked on, showed a larger grasp of human nature than the majority of our colonels did then, or even, I am sorry to say, do now. They pre-



ferred and still prefer the saying "if you want a thing done, do it yourself," which is excellent as long as the thing to be done is within the power of one man, but which is bound to defeat itself when on the outbreak of war the work suddenly exceeds the individual's power. Then the man finds the strain exceeds his capacity, and he has no staff available, trained to take a part of the work off his shoulders.

There is yet another feature to be considered: viz., the training of the young officers who joined after the war. When they had once been through their recruits' course there was nothing further for them to do. They could not presume to instruct the war-seasoned veterans, and they would not, under the colonel and sergeant-major system, have been allowed to do so even if they had wanted to; and the greater part did not want to, for it was rather too large a demand on one's self-consciousness, and well-bred youths dislike the occupation vulgarly known as "teaching one's grandmother, etc." I well remember one's utter feeling of helplessness as a young officer in front of a body of veterans. It used to be said they never made mistakes, "drunk or sober," and though I never saw them drunk, and therefore cannot judge, it was certainly true of them in the latter state.

Hence it came to pass that about the critical years from '66 to '74 hardly a captain or lieutenant had ever had the opportunity of learning more of his duties than the repetition of the words of command by rote;—of the method of imparting instruction to recruits only those who had been adjutants or musketry instructors possessed even a trace—but this alone is a fine art in itself and only to be learnt by experience.

At the same time all the old veterans grew old together during the years immediately preceding the Cardwell short service act in 1871. It was openly stated by General Peel, the previous Secretary of State for War, in the house, that the question was no longer "how the British army was to be recruited but whether it could be kept up at all."

Thus when the short service system became law we found ourselves face to face not only with the problem of how to train an enormously increased number of recruits with no trained staff to do it, but with the task of completely reorganizing our tactical system in accordance with experience with which none of us had any practical acquaintance at all.

One of these tasks at a time would have been sufficient, but

as if this was not enough, yet another trouble arose through the abolition of purchase act passed the same year.

Rightly or wrongly, a great number of officers felt themselves bitterly aggrieved, and openly proclaimed in mess-rooms and clubs that faith had been broken with them, and the service for all they cared might go to the dogs. Some, fortunately not many, were as good as their word. This vitiated the atmosphere in which the subalterns grew up. The immediate effect of the bill was to create a tremendous clearance of the senior officers so that presently young officers began to obtain captaincies in six or even five years, and these were certainly, considering the conditions of chaos out of which they had been evolved, not sufficiently experienced to accept the full responsibility of a captain's rank as understood in Germany.

All these difficulties naturally retarded the growth of any uniform school of tactical training, but still another one requires to be dealt with.

From the first appearance of the breech-loader there formed at either extremity of the long line of indifferentism two little groups which we may call the tacticians and the soldiers. Unfortunately the tacticians were not soldiers, and the soldiers not tacticians enough—there were honorable exceptions in both classes but in the main the distinction holds good.

The tacticians were intellectually the most able, they consisted of men both energetic and pushing, determined to come to the front and shunning no labor, but unfortunately in many cases with something too much of the enthusiast's temperament and a constitutional inability to grasp the whole laws of evidence. They would have made admirable special pleaders but indifferent judges. They soon acquired the control of the press and magazines, and thus led public opinion.

The soldiers on the other hand, less able and less addicted to the pen, led the opposition in the army. They swore by rigid drill and "spit and polish" and actually possessed a decidedly larger share of the personal gift of command than their opponents, but the times being peaceful the pen proved mightier than the sword, and step by step they were driven to the wall.

Both sides indulged largely in personalities, which did not tend to reconciliation exactly: whilst the soldiers were described in the heavy dailies and magazines as obstructives, barrack square soldiers, bow and arrow generals, etc., their opponents in mess-

rooms and clubs were ridiculed as short-sighted pedants with a firmer seat on an office stool than on a horse, and anecdotes went round telling how so and so, who in his own estimate would have been a formidable enemy to Napoleon at Austerlitz, had clubbed his command whilst endeavoring to march it to church and back. Unfortunately subsequent events in Africa and Afghanistan have only too conclusively proved that both were approximately in the right. Between the two stools the army of course fell to the ground.

In face of the enormous increase of work thrown on the officers by the introduction of short service and the urgent necessity that existed of educating the latter for the new responsibilities inseparable from the situation, hearty coöperation between the two was the great and pressing need of the moment. But that was just what we did not get. Whilst the tactician taught us from his point of view in the lecture rooms, the soldiers damned us in the drill ground and confusion became worse confounded.

Bearing in mind what has been written above it can excite no surprise that it was so; the wonder would be if it had been otherwise.

The first necessity of the moment was the production of textbooks to meet the demand for tactical education, and the penmen were, of course, the first in the field. Since no previous effort whatever had been made to teach them the rudiments of the game on sound principles, each had adopted the point of view best suited to his personal idiosyncrasy, and as in the military literature accessible previous to the war of 1870 it had always been studied more as pure than as applied mathematics, and long service traditions tended to strengthen the tendency rather than otherwise, the ultimate strength of the materials on which the structure of tactics has to be built up was ignored, and the one new and conspicuous factor, the breech-loader, assumed abnormal proportions. Since it was so in Germany where short service had been in force for over sixty years, it is not to be wondered at that the point escaped observation in our own army.

The news from the battle-fields strengthened the tendency for the reasons already indicated. The Germans had fought in dense lines of skirmishers and had been victorious, therefore they had been victorious because they fought as skirmishers, and the earliest pamphlets confirmed the impression.

With the evidence before them, the greater their intellectual

ability the more certain was the conclusion, and no blame can be attached to them for formulating it.

But we have already traced the genesis of these early pamphlets and know now that the conclusion was premature.

The Germans won, not because, but in spite of their local tactical handling; they fought as skirmishers because, under the inequality of armament and the want of confidence their infantry felt in the artillery, a consequence of 1866, they could not fight in any other order; for against the unshaken power of the French breech-loaders to which they could not reply, and owing to the want of discipline inherent in a peace trained short service army, all other formations scattered or dispersed, only the bravest going on.

This is what Meckel, one of the very first of their tactical authorities, says in his "*Allgemeine Lehre über die Truppenführung im Kriege*" dated 1881,—a book which still enjoys the highest reputation in Germany,—comparing the attack as it should be with the attack as it was: "In the experiences of the last campaign we see the consequence of this dismal self-destroying belief in the unavoidable disorder and rudderless confusion of the individual order. (The idea that originated out of Capt. May's tactical retrospect, be it noted in passing.) There too we saw whole brigades advancing with drums beating and colors flying. Suddenly the scene changes before the unshaken fire power of the adversary and in a moment all are borne away in the confusion of the 'individual' combat. Woods, villages, hollows, till now denuded, fill themselves to overflowing with scattered units from all commands, and the open fields lie tenanted only by the victims of premature violence. But turn the order about, let the thunder of the guns precede the beat of the drums, the fire, the bayonet, and the fight will regain a healthy aspect."

Unfortunately for us, publishers soon found the issue of translations of German pamphlets unremunerative, and we had no body of experienced officers, who had seen the breech-loader at work, to fall back on and to check the pernicious doctrines embodied in the early works. The older soldiers who had seen war and knew almost all there was to be known as to the conduct of troops under fire, felt there was something wrong, but could do nothing against the quotations in black and white from the pages of Boguslawski and other writers; moreover though they knew the note of a 12-bore ball and the whizz and whirr of grape, they had

never heard the whistle of the chassépôt or needle-gun bullet and felt they were not on very firm ground, so they forbore to answer, but the tension between the two parties was increased. Why it never occurred to any one to calculate the number of projectiles to be faced in a given time passes my comprehension, yet it ought to have been evident enough that it is quite immaterial to the man who is down, at which end of the barrel the bullet which stretched him was inserted, and that on the whole the smaller the bore,—velocities being equal,—the less dangerous the wound, for a thirteen-inch mortar shell in the pit of one's stomach creates a greater disturbance of the nervous system than a grain of No. 6 shot. If therefore it could be shown, that both in the Sikh war, the Crimea and the Mutiny, our troops had faced victoriously in lines two deep a heavier fire than the Germans ever encountered from the muzzles of the French in 1870, the fact that they failed to stand the strain in the same formation was no proof that the formation in itself was a bad one and therefore to be eliminated from our drill book.

The fact of course is that no formation is in itself absolutely good or bad; the whole point lies in the circumstances under which it is employed, and these circumstances are never quite the same. But in all cases the commanding officer on the spot is the sole judge, and troops must be trained to obey and not decide for themselves.

That the facts are as I have stated them can be ascertained from the maps of the different actions. What our enemies lacked in rapidity of fire they made up for by superior numbers, and frequently by the disposition of their works and the weight of their artillery. Thus in the assault of the Redan at Sebastopol on the 18th June, more than one hundred heavy Russian guns from 24- to 68-pdrs. crossed their fire of grape and shell over the narrow plateau across which our line advanced, and the parapets were densely thronged by infantry, yet even our ladder parties reached the ditch, though the distance to be traversed exceeded 500 yards,—and what happened subsequently is not relevant to the point.

Had this line of argument been insisted on, something might have been done to check the progress of the evil, but it was not, and with every year matters went from bad to worse, till the experiences of the Soudan and Afghanistan gave a temporary check; but the baneful idea, founded on the early pamphleteers, that the

object of the soldier in battle is only to avoid being killed, had, as a consequence of ten years' examinations for promotion, taken too deep a hold to be eradicated even by experience, against which it could always be argued that it was not gained in face of the breech-loader, and that the weapon itself had been much improved in the interval.

Judging by the earnestness and real ability shown by the tacticians in analyzing the evidence available to them, matters might have gone very differently had not the publishers interfered and cut off the supply of fresh facts; but failing these fresh facts, the evil intensified itself, partly as a consequence of one very admirable quality of the British officer when properly applied, viz., his practical common sense. He studies as a rule with the determination to succeed, not out of any love for the subject itself.

The introduction of text books and of examinations for promotion made it abundantly clear what course of study was the best investment of intellectual capital, and he took it. In doing so he often acquired a real interest in tactical literature, but too often an exaggerated belief in his own intellectual ability, confirmed because he had obtained more marks in an examination than his comrades. He read more, but with the preconceived bias in favor of what had paid him best, consequently he selected those works for notice which accorded best with his acquired line of thought, and further he interpreted other books, objective records of facts,—Prince Hohenlohe's *Letters on Infantry*, for instance,—from his own standpoint, and the greater his ability the worse the intellectual tangle in which he involved himself, so that with every year matters became worse instead of better.

With every year too, the resistance of the soldiers became weaker, for their generation was passing away and the tacticians were rising into higher command, so that self-interest pointed the way with double emphasis.

Thus every year the original errors of the German pamphleteers took firmer and firmer root. Partly as a consequence of the schism between the two schools the fundamental idea of "drill" became obscured, and the term has received a meaning it was never intended to convey, that is to say, it has been confused with *manœuvre*—"the rapid, orderly change of troops from one formation to another,"—which is not "drill," but the "application of drill" to an end; but more particularly because, whereas it paid to be able to quote glibly from Boguslawski, May, etc., it



did not pay to be equally at home in the latter works of Meckel and Scherff, and least of all was it remunerative to be in a position to state from personal observation how these things were actually understood and applied in the German autumnal manœuvres.

The whole movement has culminated in the production of our latest infantry drill book, which amongst much that is good and a good deal questionable, contains one or two statements of principle so absolutely false, and so dangerous if admitted, that they suffice to condemn it.

One will suffice to prove my point.

"Close formations are not practicable against troops provided with modern arms,"—that alone is enough; it is too the fundamental error of the early German pamphleteers. It assumes that no matter what the condition of the troops, their fire remains constant, above a certain limit. In other words:

Let  $c$  be any constant taken to represent the fire power of a given body of troops, and  $a$ , the condition of troops,  $b$  their armament; then

$$a \times b = c.$$

Since  $a$  is distinctly variable and as experience shows changes with every movement of the engagement, then if  $c$  is always to remain constant,  $b$  must vary inversely as  $a$ ;—in other words, the worse the troops the better the rifle in their hands becomes, and the new magazine rifle is intrinsically a better weapon in the hands of a rabble of Hottentots than in the hands of the British Guards. Therefore it is useless to waste time either in education or drill because the rifle adapts itself automatically to their requirements—which is absurd. Q. E. D.

This is the net result of twenty years construction on bad foundations, and as already stated, there are indications that the same process is leading to similar results in America, as indeed it must logically do if the premises are adhered to. But there is scarcely a shred of evidence which will bear examination to support these premises, and what there is simply arose out of a blind unreasoning acceptance of the predictions of the peace time small-arm inventors.

What would be said of the sanity of a board of railway directors who in deference to the views of some "crank" converted the whole of their rolling stock without sufficient inquiry? The thing is inconceivable, for, as already pointed out, daily traffic affords opportunity for experiment and false prophecies soon find

their level. Wherefore the soldiers should not be too hardly judged.

The truth all along has been that we have allowed ourselves to be taken in by a phrase—"the breech-loader"—and both in England and America we should have done better to listen to the voices of our most experienced men and have learned from them the common-sense view of the matter, viz.: that it is the quantity of well-aimed projectiles to be faced in a given time which alone signifies; it is immaterial at which end they are put into the barrel. Given disciplined troops, it is in the power of the commander-in-chief so to handle them that they shall never be called on to face more than they are able to bear.

The greater the skill at arms and the discipline—the consequence of drill, the smaller the number of men required and the greater the rapidity with which they can break down the enemy's fire to the requisite inaccuracy; but "skill at arms" in action depends on "courage," and "drill" teaches courage, therefore, fundamentally, the most important point in a soldier's training is and remains always, "drill" intelligently applied.

Had breech-loaders suddenly been placed in the hands of both North and South during the war, beyond an alteration in distances between following lines no other change would have been required to place either side on a level with the German tactics as they now are. Or had we gone to war in 1870 would more have been necessary, as far as the drill formations were concerned, than the conversion of the whole of our line into light infantry. In both cases we should have had to pay with men's lives for the deficiencies in our artillery and cavalry and staff training; but as concerns the infantry only, a general in command of either would have had in his hands a weapon at least as well suited for his purposes, and even better in some respects than the Prussian infantry in 1870. If the leader had blindly set them tasks beyond their capacity they would have broken ultimately, even as the Germans did; but if he had used his cavalry intelligently to find out where the enemy was on the battle-field, and massed his troops in the required strength for the assault, according to the degree of preparation induced by his artillery fire, they would have overrun their enemy with the same certainty as the Germans did when they too attended to the same preliminaries (which was very seldom the case).

In public opinion the idea has taken firm root that the object



of a soldier's training is to teach him how to avoid getting killed and that momentary exposure even at telescopic ranges to the terrible weapons of modern days will inevitably entail that result. With the same object, officers are taught to avoid all risks coupled with direct assaults and to employ formations which attract the least attention. Though the subject is sufficiently serious it always reminds me of Mark Twain's conversation with Gambetta's second when, in reply to his suggestion to use battle-axes, the latter hints that "bloodshed" might possibly result. "That's about the size of it," said Mark. "May I inquire what your side was proposing to shed?"

The Germans years ago gave up this pusillanimous theory—for which they have invented the most descriptive, but untranslatable epithet of "*Verlustseuche*," the avoidance-of-loss epidemic—and have returned to the healthier view expressed in 1810 by Scharnhorst when the same idea was mooted as a consequence of the disaster of Jena. "We must teach the soldier how to die and not how to avoid dying." Their present extended order system is adopted to secure the fullest development of the fire power of the rifle as long as the men retain the necessary coolness to utilize it, and also as a means of cultivating their intelligence to the best advantage. Whether it is to be employed or not on any given occasion depends on the circumstances and their appreciation by the commanding officer. Sometimes quality of fire alone will suffice. Sometimes deficiency of quality must be compensated by quantity, and the man on the spot in direct command is the sole judge which of the two to employ, but in either case the strictest discipline guarantees obedience. In the new English drill-book not only are men and officers taught that closed formations are impracticable against troops armed with modern weapons, but by the precise direction "all movements, when there is possibility of contact with the enemy, will be covered by a screen of troops in extended order in order to feel for him and to prevent surprise" it entails on us the very conditions which led to the confusion and loss in the Franco-German war, and practically precludes our obtaining except at very great cost the fire superiority indispensable to an assault. For not only will screen, supports and reserve be involved in the same sweep of the enemy's projectiles, if he means to surprise us, but the extended screen compels us to put in our fire power by dribblets instead of in mass, and ensures our destruction in detail.

That troops in close country should move with proper precautions is self-evident, but when it comes to the direct assault (and all flank attacks in battle are locally direct ones) across an open glacis chosen presumably by reason of the absence of cover, the utmost possible development of fire power in the minimum of time is not only the best guarantee of ultimate success, but also against possible surprise, and that maximum development of fire will generally result from the employment of the line.

An example will make this clearer. Imagine a line of small columns advancing in perfectly open ground preceded by a screen of, say one man to two yards and two hundred yards in advance. At about eight hundred yards the enemy opens and his bullets score equally on both screen and following line. The screen halts and replies, but its fire is lacking in density to seriously unsteady the enemy's aim, and the supporting line has to press on, its fire masked by its own men in front. By the time it reaches the screen, the screen is practically shot to pieces and the line itself considerably out of hand; its fire will therefore be less and the following troops suffer more. Had the line advanced with its front unhampered by a screen, the moment it was compelled to reply it would have done so with fourfold the intensity of fire and all the better prospect of success. In rolling ground the result would be even more marked, for when two bodies butt up against each other over a ridge in the ground, the side which develops the heaviest fire the soonest has the best chances of success.

And even in the desire to save the individual soldier's skin, the advocates of the "screen, supports and reserve" formation have overshot their mark. Since the screen presents in itself very little power of endurance, the supports must be close at hand, the reserves also, and so on. Hence the whole vulnerable area exposed is considerably greater than when lines follow one another at relatively great intervals. To satisfy one's self of the fact, it is enough to plot out the troops in position to scale, or better still form a couple of brigades side by side in the two formations on the drill-ground. Into a comparison of the detail of the two drill-books it is unnecessary to enter. It is quite immaterial to the winning of battles whether men step off with the right or the left foot, whether they shoulder in one or two motions; but what is vital is, the way in which they are taught to execute the movement whatever it may be. In all drill-books that I know except the German, the chief stress is laid on getting the movement car-

ried out. In the German one, it is the way in which it is carried out which is the essential point. Every order is to be obeyed under all circumstances with "the fullest exertion of will and body," in other words with the utmost smartness attainable. In others no stress whatever is laid on the smartness. But this omission defeats the whole intention of "drill," which is nothing more than a practical school of training designed to give men a higher degree of self-control than they normally possess. If the object were merely to enable them to shoulder arms correctly together, a week's training would suffice.

But ample war experience has demonstrated abundantly that a week's training does not suffice to form troops disciplined enough to stand the strain of battle; on the contrary it has shown that other conditions, such as patriotism, armament, etc., being equal, the troops longest trained and best drilled have shown a markedly greater capacity for enduring loss without defeat. They may, and often have been, as were the Prussians at Jena, defeated by armies less well disciplined, but then the fault has always lain in the leaders. Statistics show that their endurance of loss, in such cases, was above the average, and that alone is the criterion of excellence for troops as instruments in the hands of their leader. But this test is precisely the one which it is impossible to apply to an army in time of peace and hence it is of all others the one most likely to be overlooked. It is to the credit of the German drill-book to have kept alive this one and most important tradition, and the value of the others vary in precise proportion as the point has been more or less imprinted by regimental officers on the spirit in which they are interpreted. Fortunately our regimental officers, thanks to their conservative traditions, have retained something of the true military spirit in their men, but it is no thanks to the drill-book itself, which sins in principle more glaringly than any other with which I am acquainted.

## THE KNAPSACK AND THE ARMY SHOE.

BY CAPTAIN W. E. DOUGHERTY, 1ST U. S. INFANTRY.

OF the many qualifications now required of infantry, the one of special and supreme importance is mobility;—the power to make long and rapid marches, and arrive at the objective point in a condition fit to enter at once into a combat with a reserve of vital force sufficient to withstand the physical strain of the prolonged exertion incident to a battle. This qualification is now of greater importance than ever. Intelligence is now transmitted with extraordinary rapidity over the whole theatre of operations, and grand tactical manœuvres on and near the field of battle are made with much greater facility and certainty than formerly. It is therefore necessary that the infantry columns converging on the strategic and other important points, and on the field of possible or existing action, be free and unencumbered so that they may move with great rapidity. The effort made to meet this necessity by lengthening the step and by quickening the pace is ineffectual and of no value. The chief causes that impede the rapid movement of infantry are heavy burdens and defective shoes, the disability imposed by the latter being greatly augmented by the oppressive and unnecessary weight of the former.

In the European armies a great deal of attention has been given to the diminution of the weight of the knapsack, and to the improvement of the foot-wear of the soldier, but satisfactory results have not been attained in either case.

Some kind of a pack is carried by all European infantry, the weight varying very materially, and being in all cases very great. The packs generally have the shape and dimensions of the knapsack formerly carried by our infantry, and are slung in the same manner, except in the English army, in which the pack is suspended, about on a level with the loins, by two straps passing over the shoulders and fastened to the waist-belt in front. The pack is steadied by two straps passing under the arms from the knapsack to the straps in front of the body, the equilibrium being maintained by the weight of two filled cartridge boxes on the waist-belt in front. This is the best contrivance of

the kind now in use, but the weight is so great (about 50 lbs.) that long or rapid marches with the packs are impossible, and in an emergency requiring speed or forced marching they would have to be abandoned.

In our service the outfit now deemed necessary for field service is

1st. The blanket bag, containing :

2 blankets,	1 pr. trousers,
1 poncho,	1 shirt,
1 piece shelter tent,	1 pr. drawers,
1 overcoat,	2 pr. stockings,
1 pr. shoes,	1 towel,
1 piece of soap, etc., the whole weighing about 34 lbs.	

2d. The haversack, containing the meat-ration-can, tin cup, knife, fork, spoon, tin plate and three days' rations of hard-bread, pork or bacon, and coffee and sugar, only,—weighing 9½ lbs.

3d. The canteen, which when filled weighs 5 lbs. and 10 ounces.

4th. Rifle and bayonet, weighing 10 lbs. 2½ ozs.

5th. Field-belt and bayonet scabbard, weighing 1 lb. 12 ozs.

6th. Seventy rounds of ammunition, weighing 7 lbs. 9½ ozs., being in all over 64 lbs., and not including such accessories as pocket-knife, money, pipe, tobacco, etc., or a daily average of about 60 lbs., which would be increased materially when wet by rain. It is of course out of the question that men bearing such loads can make long marches, or that they can make a rapid march for any distance. In the cooler and more equable climate of Europe, where the roads are broad and smooth and generally well shaded, and where for a good part of the year the troops are daily exercised in heavy marching order, in active service marches of 14 to 18 miles a day are made, but the speed is necessarily slow, and when rapid marching becomes necessary the knapsacks are left behind. It is shown that on such occasions they are generally lost.

In the Civil War the troops organized on both sides were supplied with the knapsack, and about a million knapsacks were supplied from the North to replace early losses in the field; yet in the second year of the war a knapsack was rarely to be seen in the field, except in the new regiments that had not yet done any marching.

When the movement of the Army of the Potomac from the Chickahominy to the James began, in June, 1862, the camp equip-

age and knapsacks of the 5th Corps were piled up and burned, by order of the corps commander. The men made a roll of one or two blankets, a poncho, and a piece of shelter tent, in which, generally, were carried a shirt and pair of stockings, and with this outfit the remainder of the Peninsula Campaign, the campaign of the Second Manasses, and the Maryland Campaign were made.

In October the men were again supplied with knapsacks and a small amount of clothing. The weather being cool this light outfit was easily carried, at first, but when a reconnaissance was made, or when an action occurred, blanket-rolls were made up from the contents of the knapsacks and the latter were piled up somewhere and left, with the possible chance of not finding them again. In a short time, from these and other causes, many of the regiments were again without any equipment but the blanket-roll, which the men never parted with, and in which was always carried a small supply of underclothing, and very frequently the extra supply of ammunition.

In November a full outfit of clothing was issued, and knapsacks were again supplied the troops that were without them. Soon afterward occurred the battle of Fredericksburg. During the three days that the place was occupied, nearly, if not quite 40,000 men crossed the bridges and bivouacked in and about the town. The troops that marched out and formed line behind the town left their knapsacks piled in the streets with guards over them, the men taking the blanket-roll and a change of clothing, as before. The army was withdrawn during the night (of the 15th Dec.), and about 20,000 knapsacks were abandoned in and about the town. Had the attack on Lee's army been successful the troops would have gone forward in light order, and the result, as to the knapsacks, would have been about the same. The first Confederate troops organized abandoned the knapsack as soon as they got into the field and began to march, and at any time did not carry the loads carried by the soldiers of the Union. It may be for this reason that our troops were generally outmarched by them when moving on parallel lines. Jackson's Corps made a detour round the flank of the Army of Virginia, in August, 1862, of 62 miles in 40 hours. When leaving the Peninsula, at the same time, the 5th Corps of the Army of the Potomac marched from Harrison's to the Chickahominy, 37 miles, in 17 hours, and frequently made over 20 miles a day in the next two campaigns. Sherman's army marched an average of 27 miles a day from

Raleigh to Manchester, nearly 200 miles, and the Army of the Potomac returning to Washington marched an average of 25 miles a day. Two divisions of the German army marched respectively 23 and 27 miles in 18 and 19 hours, the day before the battle of Gravelotte. This was considered extraordinary, which it was if the men carried the packs. We know, however, that Grant's and Sherman's troops marched without any loads except the blanket-roll, rifle and ammunition.

It must be apparent from what is shown above that troops can keep the field for five or six months, and longer, without any camp equipage whatever, and with a supply of clothing so scanty that it is practically no encumbrance whatever to the men to carry it, and that physical suffering from exposure would not be seriously felt, except in a cold climate, and in the winter season.

During the winter campaign in Virginia in 1862-63, the men had no other covering in camp than the shelter-tent, and although there was discomfort from the cold and wet, the sick report showed a much lower per centum than prevailed when the troops first took the field and lived under canvas.

We see now that future wars must be of short duration, and that the magnitude of the forces that will be brought into the field, as well as the great rapidity of movement now indispensable in all military operations, make it impossible to move the great amount of equipage that has heretofore been taken into the field, and nearly always lost or destroyed.

In accordance with these views, I think that a battalion of 400 men, more or less, should enter the field with three wagons only; one for the records and the officers' baggage, one to supply ammunition and clothing, and one to supply subsistence each second or third day. The first wagon should follow the battalion except when going into action, when it should be replaced a suitable distance in rear by the second. The third should keep the battalion supplied with subsistence from the division train. A tent of the dimensions of a wall-tent, with a wall a foot high, is sufficient for the officers of a company in a campaign, but as there are times when the wagons cannot be brought up for several days, officers should carry a blanket-roll and a supply of food in a haversack. By these means each fighting unit would always have its own outfit separate, and when detached, or sent on special service, it would be freed from the inconveniences that are too numerous to mention here, but which every officer who has had the experi-



ence may recollect. A company should enter the field with two books only, the morning report book and an account book. The former should be remodelled to make it show the soldier's entire military history, and the latter should be changed so that it would show every item of account with the soldier, of whatever nature. No blank forms or stationery should be taken in the company outfit, for any purpose. The battalion quartermaster should be responsible for the ordnance and ordnance stores, as well as for the clothing and other supplies, and the brigade or division commissary should issue direct to the troops, as was generally done in the field during the war.

The infantry soldier should be equipped with  
 His rifle and bayonet, weighing (about) 10 lbs. 2 oz.  
 Ninety rounds of ammunition (cal. .30).  
 Belt, bayonet, scabbard and 2 pouches, weighing 9 lbs. 8 oz.  
 Blanket and all, weighing 9 lbs. 13 oz.  
 Haversack, with two days' rations of bread, bacon, coffee, sugar and salt, weighing 6 lbs. 3 oz.  
 And canteen with water, weighing (about) 3 lbs.  
 A total weight of about 38 lbs. 10 oz.

The average weight carried daily would be about 34 lbs. Both the haversack and canteen are too large and clumsy. The canteen should be diminished one-third, and the meat-ration-can, which is of very little practical use, should be abandoned. Each soldier should be supplied with a small bag of close texture in which to carry ground coffee or tea, one for sugar and one for salt. The tin cup should be one-third larger than it is, and should have a hinged cover. Coffee and soups can be made in the tin cup just as well, and much quicker than in the camp kettle, and the occupation of company cook should be unknown in a campaign. About 2 per cent. would thus be added to the fighting strength. If our chemists could imitate the German chemists in condensing the nitrogenous constituents of the ration, six days' supplies could be carried in the haversack about as easily as two days' supply can be carried now. The shelter tent half should be widened 2 inches and lengthened 3 inches, and the halves should be united by strong tape instead of by buttons and holes.

Should there be any objection urged against the above as impracticable, I have only to reply that the thing has been done before, by men who made long and rapid marches, and endured the privations of short rations and exposure with equanimity and



cheerfulness, and for a longer time than troops will probably be called upon to endure them again; and that it is my belief that in future campaigns, to attain the maximum of efficiency in the field the conditions will inevitably come to this:—that ponderous camp equipage and the paraphernalia that heretofore was thought to be necessary for an army taking the field, is soon to be a thing of the past in campaigns, as the knapsack practically is now; and that the burden of the infantry soldier will hereafter consist chiefly of ammunition and the staples of the ration, condensed to a degree that will enable him to subsist independently for a week in a position, or while making a hundred and fifty mile march to reach one.

One cannot speak or think about a march without raising the spectre of unrest that rises with the thought of the army shoe. I am in doubt whether or not the question of the shoe is not a more important one than the question of the load the soldier ought to be compelled to carry on the march. For the sake of brevity I think it necessary to pass over much of importance that may be said about the anatomy and about the care of the feet, without regard to which any shoe, however artfully constructed, cannot be made to give ease and comfort.

In France, Germany and Switzerland more attention has been given to the foot-wear of the soldier during the last 20 years than to any other item of his equipment except the rifle. There is cordial unanimity in the idea of what the shoe ought to be, but a shoe that gives entire satisfaction has not yet been adopted anywhere in Europe. The disastrous effects of the defective foot-wear of the 75,000 troops of the Swiss army sent to the frontier in 1870-71, led to an investigation of the faults of the shoe worn by the infantry and to an effort to find a remedy. It resulted in subsequent experiments with loose, easy-fitting shoes without gaiters, then with shoes with gaiters, and finally in the adoption of a boot which is proving as unsatisfactory as the shoes proved to be. We are committed to the shoe for our infantry, and I think that it is the best foot-wear, but no one can be found who will admit that the present army shoe is as effective for marching as the general line of cheap custom-made shoes to be found in the shoe stores.

A pair of No. 8 shoes of the kind now issued of the model preferred by the men—the Waukenphast—weighs  $2\frac{3}{4}$  lbs.—an excess of about a pound. The upper is made of two pieces, one

overlapping the other in a coarse seam across the instep. When the shoe is properly laced, the pressure under the seam is abnormal and unequal, and becomes severe and painful when the foot swells a little from heat, or from the exertion of the march. The top of the upper stands six inches above the heel, confining and restraining the natural leverage exerted at the ankle in walking, and causing excessive perspiration about the ankle-joint. These effects are not much felt except on the march, when the feet become swollen from the heat resulting from the physical exertion, in either cold or warm weather. Every defect in the shoe then becomes apparent, and results in pain and some disability, which sometimes becomes total.

Statistics on this subject, if carefully kept, will show that on marches of from five to ten days duration, more than thirty per cent. of the men will suffer from severe abrasions and from blisters, and that five or six per cent., on a long march, will be totally disabled.

It must be apparent therefore, that the present army shoe is not suitable for infantry, and that in continuous marching, or on long marches, a very considerable part of the force would be compelled to fall out. In a march of 20 miles a day for seven days, thirty-five per cent. would be disabled or left behind:

After a good deal of thought, and some investigation on the question of what constitutes a good marching shoe, I have come to the opinion that such a shoe cannot be produced until experimental tests for it are made, and conducted on anatomical principles; and by this I mean that the shoe must be made to conform to the anatomy of the foot in its natural state.

It is beyond question that the human foot has become deformed by the long use of boots and shoes modelled in accordance with the caprices of style and fashion, and that this characteristic deformity has become to some extent hereditary. A comparison of the feet of an Indian and white man will show this. In the aboriginal foot the axis of the great toe is in a direct line with a point in the very centre of the heel, while the other toes, permitted the development intended by nature, are left free to contribute their share to the support of the weight of the body upon the whole foot. The examination of a child's foot will illustrate this more clearly than it can be illustrated in writing.

An examination of the deformed foot—the average man's foot—will show that the great toe is turned to the left on the left

foot, and to the right on the right foot, and that the other toes on each foot are folded under, or forced out of place, by contraction, and that the right line through the longitudinal axis of the great toe will fall some distance—more or less in each case—outside the heel. The consequence of this is that the weight that ought to be supported equally by the whole foot, is thrown upon the outside, and that if the foot is the least compressed the stress will result in inflammation and sore feet at the first test of endurance.

If the men could be measured individually, and their shoes made from the measurements, these defects would be much remedied, but this is next to impossible, and I think that the shortest and easiest way to relief, is to modify the shape of the standard shoe for the army. The Waukenphast model is an approach to the true principle, and if this model were developed until the outline of the shoe would somewhat resemble that of a moccasin, we would have a shoe in which there would be ease and comfort, and in which men could march to the limit of endurance without blisters and abraded feet.

## MILITARY MISCONCEPTIONS AND ABSURDITIES.

By CAPT. JAMES CHESTER, 3D U. S. ARTILLERY.

**M**ISCONCEPTION is the mother of absurdity. In matters personal; in state affairs; in religion; in war; in everything and everywhere, the progeny of misconception play the fool. And they are never without advocates and admirers. Men believe in them because they are rational deductions from what they conceive to be fundamental facts. They build upon them as a sure foundation, and call upon the world to admire, accept and reward their work. They court criticism with superb confidence, being enamored of their own creations, and blind only to the false foundation upon which they stand.

Such absurdities, being accepted as veracities from generation to generation, acquire, in course of time, the character of facts which it takes some courage to question. They are so specious and scientific. There is nothing false about them but the foundation. They may be, and almost always are, beautiful constructions, correct in proportion and perfect in style. But when the rains descend, and the floods come, and the winds blow, they go down to destruction, because they are founded upon a misconception and not upon a fact.

The deductions of science are not always to be trusted. Compare the teachings of fifty years ago with those of to-day and explain the difference. Those are absurdities. What will these be fifty years hence? Those were as beautiful and true to the men of their day as these are to us. Why have they become absurdities? Was the Reason of our ancestors at fault, or were their conceptions of the bottom facts erroneous? Human Reason remains the same from generation to generation. Conceptions change from day to day. The conceptions of fifty years ago were misconceptions, and the fair fabric built thereon was a beautiful absurdity. Nature does not disclose her secrets to everybody. They must be spiritually discerned. To the spiritually blind they must remain forever unknown. The wisdom of this world will be foolishness until the end of time.

The children of misconception may be found in every depart-

ment of science, and in every walk of life. Military science and the military profession are fairly full of them—perhaps consist of them. Who can say with certainty that his conceptions are not misconceptions? The devil can transform himself into an angel of light, and absurdities can clothe themselves in the garments of veracity. Few men are capable of discerning fundamental facts. Wonderful as our means of communication with the material world are, we must admit them to be exceedingly unreliable, and in the domain of the spiritual the majority of men are absolutely blind. We dare not speak authoritatively then, on this subject. We can only turn such light as we possess on some of the seeming absurdities, and those that hear may judge.

One of the oldest military misconceptions is the belief that battle is a contest in killing between armies. In ancient times when fighting was hand to hand, and the restraints of discipline were unknown, the slaughter in battle, or rather after the battle, was immense. But it was all—or almost all—on one side. The victor lost but little. The vanquished were annihilated. If any escaped it was by fleetness of foot, or the close proximity of a place of refuge. The point to be noted is, that most of the killing occurred after the battle was won. It was not all essential to victory. Up to a certain point it was war. Beyond that point it was massacre, and massacre has no legitimate place in the practice of war. There were no just grounds then, even in those early days, for the popular belief. The popular conception of war was a misconception, and has been the mother of many absurdities.

The indiscriminate slaughter which followed victory in ancient times, was political rather than military. It was the ancient way of "spoiling the Egyptians." Fighting men were the real wealth of a nation in those days. Their destruction, therefore, by a victorious nation, was merely exacting a bond of behavior for the future, from its vanquished enemy. And this political barbarity continued until men found out that their fellow men had a money value. Then prisoners of war became worth preserving. The value of a victory was often enhanced, if not actually measured, by the number and rank of the prisoners secured. But, in course of time, gunpowder was discovered, and projectile arms became the chief weapons of war. Armies engaged without coming into personal contact, and the chances of escape after defeat were increased. Prisoners of rank became difficult to capture, and common soldiers lost their market value. Some other way of "spoil-

ing the Egyptians" had to be devised, and Loot became the prize of victory. But Loot had an evil influence on the victor. It was an element of discord and danger in the victorious army which commanders were willing to be rid of. So Indemnity has been resorted to as the latest, and perhaps the least objectionable method of destroying a vanquished enemy's power. The defeated belligerent is now compelled to pay the cost. The consequences of defeat then have been Massacre, Ransom or Slavery, Loot and Indemnity. But the art of war has nothing to do with any of these things. They are purely political precautions, more or less barbarous, which successful war makes it possible to inflict on an enemy. War then, is no more a contest in killing than it is a scramble for slaves, a looting raid, or a struggle for indemnity.

Physical Force, as a factor in war, has been immensely overestimated. Napoleon may have said that "Providence is always on the side of the strongest battalions," and he may have believed it. Many great men have believed a lie. The military nations of Europe believe it to-day, if their actions indicate their thoughts. Their armies are immense, and their organization, armament and equipment are simply perfect. But the perfection of the superstructure is no proof that the foundation is sound. The machine is beautiful, but what about the motive power? If there be no motive power forthcoming in the hour of need, of what use is the machine? Manifestly the motive power is a question of prime importance. Without it the machine becomes a beautiful absurdity.

The doctrine of Physical Force is a plausible doctrine, and to the natural mind a reasonable one. Scientific soldiers and students of the art adopt it at once as a fundamental axiom. It pleases them because it is tangible and fits into their formulas so well. They love to formulate problems in which battalions, squadrons, and batteries are the known quantities, and victory the unknown. The solutions of these problems, for different situations, are, in their estimation, the art of war. As a matter of fact they are only the art of kriegsspiel—a very different art indeed. The art of kriegsspiel is as different from the art of war, as tin soldiers are from living men. Kriegsspiel is an absurdity—a younger son of misconception. A likely enough lad perhaps, to the natural eye, but a soulless sham to every one capable of discerning veracity. Moral Force has no representation on the

kriegsspiel board. To the author of that game it presented itself as an unmanageable element of unknown value, the presence or absence of which could be determined only by the dice box. This absurdity indicates the parentage of the game. It is the art of war according to the infidel. Its equation is war, minus the spiritual=kriegsspiel. But war minus the spiritual is equal to zero. It is the spirit that fights. It is the spirit that makes the gamecock, cock of the walk. It was the spirit of Alexander that conquered Asia with a handful of men. It was the spirit of Cæsar that came, and saw, and conquered in Gaul. And it was the spirit of George Washington that made the United States a possibility. Spirit is the motor in war.

The army is the machine. Its personnel and materiel are the stuff out of which it is made. Organization is the mechanical arrangement of its parts. Drill, discipline and training are its trial trips. Ammunition and supplies are the lubricants which keep it in smooth working order. And spirit is the motive force. And this is true, not only of the army, but of every fighting unit in it.

A man is what his spirit makes him—a hero, or a coward, or some one of the innumerable gradations between the two. It is impossible to place him with certainty. He cannot place himself. Few men know what manner of spirit they are of. At times they can face danger unflinchingly. Again they become demoralized without apparent cause. They are mysterious, even to themselves. They cannot control the spirit within them. On the contrary they are controlled by it.

Unite a hundred individualities and set a captain over them and they become a company—a new machine containing one hundred and one centres of force. The individual parts are not all heroes. Neither are they cowards. Perhaps no two of them belong to the same spiritual grade. To work in harmony they need a moderator, a commanding spirit to strike the key-note for them, and produce responsive vibration in the heart of every one of them. This mysterious power should reside in the captain. It is his spiritual commission. Without it he cannot command effectively, however many parchment commissions he may hold. He may be learned, brilliant, familiar with all the formulas of war, a strict disciplinarian and a good tactician, but if he lacks the spirit of command his proper place is in the rear rank. A real captain is a real power. He controls the spirits of his men silently, mysteriously, magnetically. In his presence timid men become brave,



perturbed spirits calm, and everybody confident. Men will follow such a captain to the death. They cannot help it.

It is needless to say that all commanders, of whatever grade, should be captains in this sense of the term. And it is equally needless to say that very few of them are. The real commanders, who stand out clear and distinct on the pages of history, were captains by spiritual commission. They could command, even their enemies, and be obeyed. Alexander controlled the kingdoms of Asia by means of Asiatic troops. Frederick recruited his armies in the territories of his enemies. Napoleon, a stranger to the army of Italy, young, inexperienced, undistinguished as yet, and not even a Frenchman in the strict interpretation of that term, took command of that army, and order came out of chaos as if by magic. The incongruous conglomeration of British, Belgian, Brunswickers and Hanoverians which Wellington commanded at Waterloo, maintained its ground throughout that terrible struggle, steadied and stimulated to do its duty by the indomitable spirit of the Iron Duke. These men were commanders by divine appointment: era making heroes who could control the spirits of men. The art of command is something more than the art of issuing correct orders and insisting on obedience. It is easy to "summon spirits from the vasty deep"; but not so easy to make them come. It is difficult to define the difference between a real commander and an educated sham, because the difference is spiritual. Both may say exactly the same words, and do precisely the same things. But the sham can merely make himself heard. He may be obeyed, and he may not. The real commander is felt as well as heard, and must be obeyed. They are like two bars of polished steel, alike in everything, only one of them is a magnet.

We say then that an army is a machine, comparable to the human anatomy, in which the grand centre of psychic force, controlling all inferior ganglia, can command prompt, hearty, and simultaneous obedience in every part of the machine. The commanding spirit of such a machine controls it silently and mysteriously, and commands it with the confidence of a god. An army thus commanded and controlled must be effective, however insignificant it may be in point of numbers. With a commander who merely commands and cannot control, however imposing its numerical strength may be, it is but a loose jointed giant, subject to paralysis in every limb and liable to be kicked with impunity by



any active adversary that comes against it. The strongest armies are not necessarily those containing the greatest number of men. Two thousand men may be able to effect more than one thousand—let us admit twice as much. But the ratio has a limit. When the capacity of the commander is reached, every additional man is a burden and lessens the effectiveness of the army. Beyond a certain limit then, numbers are no index of military strength, and the limit depends upon the spiritual power of the commander.

The Fighting Machine is undoubtedly an important consideration in the preparation for war, but it is not the most important. The finest engines that ever were built would be worthless in mid-ocean if the coal bunkers were empty, and the finest army that ever was organized would be helpless without a commanding spirit in command. Patriotism, personal bravery and even professional skill, are of no avail. History is full of examples which prove this proposition. In 1789 the armies of France were reinforced by the addition of 200 battalions of volunteers. These battalions contained much of the best blood of France. They consisted of brave, patriotic and intelligent men, much above the average of the old army. But they were worthless in war. The democratic spirit of the time, in its general spiritual blindness, was willing to stake the national existence on physical force. It believed in the machine and knew nothing about the motor. Any patriot might be made a commander, without regard to the spirit that was in him. Seniority was the rule. Old sergeants became colonels by length of service, and young captains, however great their ability, had to wait. The consequences were such as might have been expected. Confusion, inefficiency and want of discipline prevailed throughout the armies of France. Not only were they incapable of meeting the common enemy successfully, but they could not be kept with the colors. We have seen something similar under our own flag. But Carnôt, a captain of engineers, who had found his way into the National Assembly, and had become a member of the Committee of Safety, and also Minister of War, had the true discerning spirit in him. Under his administration demoralization disappeared from the armies of France. In 18 months they had scored 27 grand victories; had put 80,000 enemies *hors de combat*; had taken 91,000 prisoners; 116 fortresses, 230 forts, 3800 cannon, 70,000 muskets, 1900 million pounds of powder and 90 stands of colors. (Encyc. Brit. II., 601.)

It reads like a romance. How had he done it? Merely by putting commanding spirits in command. Jourdan, Hoche, Pichegru, Kléber, Moreau, were men who could control as well as command. Under their guidance the full possibilities were reaped on every battle-field, sometimes at terrible cost it is true. The losses were enormous. But the fact that these commanders could hold their men to their duty under such slaughter proves our proposition. Success in war depends upon the spirit of the commander more than the numerical strength of the army.

There is much to be learned from this period of French military history. The actors then on the stage were, many of them, men of surpassing ability. Carnôt had great spiritual discernment and rarely made mistakes in selecting commanders. He seemed to be guided by instinct. What else could have prompted the selection of Hoche? He was a mere boy, of obscure parentage. He had enlisted at 16 years of age; had a very limited education and was not an ardent republican, even. As a sergeant he had defended the doors of the Queen's apartments at Versailles, against the *vassal*dom of Paris, because it was his duty to do so: and this when most of the royal forces had joined the mob. He was a king among men, and Carnôt made the discovery. Perhaps he became a colonel by length of service in 1792. At any rate we find him breveted General of Brigade and commanding at Dunkirk against the Duke of York in 1793. Next as General of Division commanding the army of the Moselle, and demonstrating his ability as a strategist and tactician by manœuvring the Austrians out of Alsace. Manifestly a managing sort of man, this Sergeant Hoche turned out to be, in spite of his humble birth and limited education.

It is so interesting to study the history of such a man that we feel compelled to follow it to the end. He was too good and too great a man to be without envious enemies. Robespierre had risen to the surface of the seething caldron of Revolution—as scum always does—and was devoting his energies to the extermination of traitors and aristocrats. Everybody was a traitor or an aristocrat whom Robespierre hated or feared, and as a matter of course Hoche was marked for destruction. He was recalled from the army, denounced, imprisoned and would have been guillotined, only fate had decreed the execution of Robespierre before that could be accomplished.

After Robespierre's death Hoche was released, and sent to

command in La Vendée, where he succeeded beyond the expectations of the Directory. He then commanded the Home army, 100,000 strong, in the pacification and disarmament of the turbulent Departments, and scored another success. He failed in the invasion of Ireland, but the weather and Wolfe Tone sufficiently accounted for that. Then he conducted a successful campaign against Kray on the eastern frontier, and was appointed to command the combined army in Germany when he died—thus leaving room for Napoleon. He was under thirty years of age at his death. It is very generally conceded that Hoche had no superior in military ability among his contemporaries, and many claim that he was the peer of Napoleon as a military commander and his superior in spiritual power. Even his enemies write him down, second only to Napoleon.

Jourdan and Pichegru—also *ci-devant* sergeants—made their marks as commanders of armies. *Jourdan*, a revolutionary enthusiast, who mingled the Marseillaise with the music of battle, and thus aroused responsive enthusiasm in the hearts of his followers, could lead his army anywhere. Under his guidance, battalions could always march forward. The spirit of Jourdan controlled the spirits of his men, and conquered by its very recklessness. *Pichegru* was a man of another type. He had been a teacher of mathematics, and had had as his pupil a certain Napoleon Bonaparte at Brienne. But he caught the revolutionary fever; became a soldier; a sergeant; a general of division; a commander of armies; the conqueror of Holland and a terror to all the enemies of France. His spirit was one of supreme confidence and stern determination. He was always in earnest, and even the vassal-dom of Paris recognized the fact. He needed no whiff of grapeshot to quell the revolt in Paris in the year III. His name was enough.

The history of these men, and especially that of Hoche, is a complete demonstration of the fact that education in what is called the art of war, is not essential to success as a military leader. They commanded by divine appointment, and the discernment of Carnôt. It is more important then, that appointments to military command should be made with spiritual discernment, than that the minds of the appointees should be garnished with all the professional jargon of the schools. The spirit of command cannot be educated into a man. Education and training can produce routine officers, organizers, drill-masters,

disciplinarians, kriegsspielers, but never commanders in the spiritual meaning of the term. The vast majority of military men are merely kriegsspielers. They are constructors, burnishers and oilers of the machine, but rarely commanders of it. They prepare it, and keep it in working order. Nay, some of them can set it in the field in creditable shape, and even drive it forward under fire to a certain point, by means of the hangman's whip of discipline. But beyond that point they are powerless. When that point is reached, they know, they feel in their hearts, that the hangman's whip has reached its limit, and that further efforts to advance will end in disobedience. Their highest hope is, then, to hold their ground. Their greatest fear is an attack by the enemy. They are already demoralized, and only need the shadow of an excuse to be defeated.

We say then, that while a man may be educated into a kriegsspieler, he cannot be educated into a commander of men any more than he can into a poet, or an artist, or a Christian.

Another military misconception with a numerous progeny of absurdities, is the assumption that victory depends upon slaughter. Were we to appeal to history on this point we should find plenty of proof to the contrary. Victories have been won without shedding a drop of blood. Gideon routed the Midianites by blowing trumpets and displaying torches on all sides of their camp at night, and a solitary sailor, in the East India Company's service, wound up a debauch by storming a formidable earthwork, single handed, routing its garrison, and capturing the work the night before the siege guns were to open on it. (*Edin. Review*, vol. CXLVIII., 191.) And even in more methodical battles, if we could sift out the losses at the moment of victory, the balance would be found in almost every case, decidedly against the victor. But the exact moment of victory is difficult to determine. General Grant has said "That there is a moment in every battle when both sides are whipped." If we could look into the hearts of the commanders we might be able to tell when that moment arrived. But we cannot do this. We must look elsewhere for information.

What is it that suggests defeat to a commander? The idea must come into his mind some time during the action. Does it first present itself as his personal judgment upon evidence? If so, what is the evidence? His knowledge of the casualties in his own army must be limited, and he knows next to nothing about the losses of his adversary. He has seen very little of the conflict

at close quarters. He cannot therefore strike a balance of loss, and decide accordingly. Still he decides. Days afterwards, when he writes his report he will be able to give plenty of reasons, but at the moment he knows nothing with certainty. Something within him speaks the word "defeat." He scouts the idea at first, and tries to conquer it by recklessness, and the result is disaster. His judgment forsakes him, and the fatal word haunts him like an evil spirit. He hears it howling in the roar of battle. The very bullets buzz it in his ear, and every sound articulates the word. The crisis of the battle has come, and the fate of the army is decided in the heart of its commander.

This part of the struggle is never studied by the kriegsspielers. It is simply foolishness to them; or superstition. They are blind to the spiritual and honest enough to admit it. They cannot distinguish between the thoughts and intents of the heart, and the judgment of the intellect. The story of Balaam is a myth or a miracle to them. They cannot discern its spiritual meaning, although it is so plain that they who run may read. Something within the prophet spoke reproof—his conscience, if you please—and he believed he heard articulate speech in the discordant bray of the dumb beast he bestrode. Just as Whittington is supposed to have heard the bells of London calling on him to return. Balaam's conscience pricked him, and his ear heard the phantom speech, as Macbeth's eye beheld the phantom dagger. From that moment he was defeated in his purpose. Greed, avarice and perhaps hatred had to yield, and he blessed where he had hoped to curse. With Whittington it was the same, yet different. He had reached the crisis of his career. Repulsed at every point, disheartened and almost in despair, he was quitting the field, when something within him suggested a return. He heard the words distinctly in the clangor of the bells, and would have heard them in the roar of battle, or even the bray of a donkey. And he believed the phantom call, took heart of grace, returned and was victorious.

And so it is with commanders of armies. At that critical moment when both sides are whipped, something whispers in the heart of each the fateful word, which cannot be suppressed. The one, refreshed and hopeful, renews the struggle with such vigor, that the other, disheartened and demoralized, believes that hostile reinforcements have arrived, and so gives up the contest. Thus victory and defeat have their beginnings at the grand centre of

psychic force, whether the belligerents be armies, school boys or chicken cocks. In armies defeat spreads downwards like a spiritual plague; subordinate centres lose their spiritual grasp, and demoralization, spiritual anarchy and defeat are the results.

As already said, few soldiers study this feature of the contest. Many indeed have observed the facts. They have noticed that some battalions will advance under fire to a certain point, but that an order to advance beyond that point is either disobeyed, or it produces disintegration. They have noticed also, that other battalions will follow their leaders into the very jaws of death, seemingly unconscious of the danger. And they have accounted for it perhaps by saying that those were cowards and these brave men. But the same men under different leaders have been observed to behave differently. How can that be accounted for? There is no escaping the conviction that the power to advance lies in the commander.

The way to victory is "*Forward*." Brave old Blücher, "Marshal Vorwärts," as his men called him, had the correct idea on this point. He may have been a very ordinary kriegsspieler on the battle-field, but he knew the way that victories were won.

Napoleon knew it instinctively. His column of attack dashed forward at the proper moment, like a shaft from a catapult, and as a rule conquered without firing a shot or staining a bayonet. The "*Forward*" did it. The question at issue was a spiritual one, between him and his adversary. It was not "How much killing can your men stand before they run?" but "Can you control them and make them stand in the face of visible and rapidly approaching destruction, as exhibited in my column of attack? If you cannot, your doom is sealed. If you can, perhaps mine is."

Napoleon's character as a man was a mystery to his contemporaries, and it is only partially known to-day. It is as a commander that history chiefly deals with him, and it is in that rôle that his character is best known. He had great spiritual discernment, and rarely made mistakes in the selection of his instruments, and he could gauge the ability of his adversaries with unerring judgment. But his power of control was not extraordinary. As a squadron leader he might have proved a failure. His spiritual gifts were those of a commander, a director, rather than a leader of men. The difference between him and Marshal Blücher was only in degree. Napoleon was a blazing noon-day sun, and Blücher, by



comparison, a smoky tallow candle; but their spiritual make-up was identical in kind. The ratio of discernment to power in each was about the same.

Wellington's spiritual qualities were differently blended. He had more spiritual power and less spiritual discernment than either Blücher or Napoleon. He was almost always outgeneraled, but never beaten. He could get more out of his men, in the way of stubborn resistance, than any commander of his day. But his power in this direction has been very generally overlooked, and historians have attributed to the men what really belonged to the commander. Wellington could control better than he could command.

Napoleon knew Wellington better than Wellington knew himself. He knew the secret of his success, and the spiritual fountain from which his men drew their staying powers. He knew that to outgeneral Wellington was easy, but to fight him was a hard undertaking. In the hundred-day campaign he knew that the soul of the coalition against him, the hope of the allied armies, was the English Duke. He knew that he commanded the right of the allied line. That he was there with a conglomerate army, the worst he ever commanded, and that it was widely scattered, poorly disciplined, and a very Babel of tongues. To defeat him, to drive him into Antwerp, or under the shelter of his ships, would have been a crushing blow to the coalition, and a powerful buttress to his own dynasty in France. To drive Blücher beyond the Rhine, was only to drive him into the arms of the allies approaching from the east. That game was hardly worth the candle. Yet Napoleon in person turned in that direction, and sent Ney against Wellington's line. Moreover, after beating the Prussians, badly as he believed, and celerity of movement was of more importance than numbers, he wasted almost an entire day at Ligny before moving upon Quatre Bras. He certainly showed some reluctance to going in that direction.

Historians say the Emperor was not himself on that occasion, but none can state, specifically, the nature of his disease. The professor of history at Cambridge University, Professor Seeley, says "A physical decay had begun in him, affecting through his body, not indeed his mind, but his will and power of application." (*Encyc. Brit.* XVII., 233.) We do not pretend to understand that sentence, but we think the Professor means to say, that he does not know what ailed the Emperor. And analysis reduces all the

historical evidence on the subject to the same negative. He had no disease, mental or physical, but his will and power of application were affected. In other words his spirit was disturbed. Men of materialistic views assume the presence of physical disease; men of deeper penetration reject the assumption as unnecessary. The symptoms can be otherwise accounted for. Something within him had spoken the fateful word, and he was struggling to suppress it. He hid himself during the whole forenoon of the 17th, when every moment was precious, and no one dared to approach him. He was irritable and cross, his discernment was clouded, and his judgment defective. He issued no orders of any kind on the 17th until 1 P. M. Then he sent Grouchy on a wild-goose chase in the wrong direction, which neither he nor his friends have ever been able to explain. Thiers boldly invents two orders, one of 10 P. M. on the 17th and another of 3 A. M. on the 18th. But Quinet, writing in 1862, after exhaustive research, says: "The two officers sent by Napoleon were never seen by Grouchy. No one has ever been able to give their names. The orders they are asserted to have carried are not to be found registered on the staff records. What is still more to the purpose in the dispatches that followed, Napoleon made no mention whatever of these orders of the night. He does not insist upon their execution. He does not even refer to them, contrary to invariable custom." In short they are manifest inventions. It is impossible to explain the actions of the Emperor on that fateful day. He was spiritually demoralized. Waterloo was lost the day before it was won.

But we have no room for further historical illustrations. We have dealt with a few misconceptions, and should now turn our attention to their progeny, the absurdities. The subject cannot be adequately treated in a few paragraphs. We shall not attempt therefore to deal with it in detail. It will be sufficient for our present purpose to present a few representative absurdities, selecting those which present the most perfect appearance of veracity. And, first, let us invite attention to *man-killing machinery*.

The art of war is rapidly becoming the art of making man-killing machinery. The world seems to have adopted the belief that the possession of superior man-killing machinery is a guarantee of success in war. The effect has been extraordinary advancement in the manufacture of weapons of war. Hardly is a new weapon adopted before an improved one is devised. The ingenuity of men seems to have turned towards man-killing ma-



chinery with an earnestness which leaves no room for doubt as to the popular belief. This also is vanity and a gross absurdity. Steel spurs can never make the barn-yard cock a warrior, nor secure for him the sovereignty of the walk. The contest for sovereignty with his game but ungaffed adversary, will be prolonged. He may kill a few more game birds than formerly, but his ignominious defeat is only a question of time. And so it is with nations. Unless the fighting spirit be there, man-killing machinery will never make them conquerors.

This, however, is no argument against the use of improved weapons. It is criminal in a nation to expose its soldiers in war on unequal terms with their adversary, even if their warlike spirit be superior to his. Blood is the real wealth of a nation, and the government that squanders it is unworthy of trust. Put gaffs on the game-cock then, even if his antagonist be a dung-hill—courage should never be discounted—but bear in mind that it is the spirit of the bird and not the armament of his heels that wins the victory. The true warlike spirit will conquer in the long run, however much it may be handicapped in the beginning; but a proper armament at the outset will enable it to do so with greater economy. The unwarlike spirit on the other hand, can never be a conqueror, however well it may be armed and equipped.

And here the question may be asked: Can discipline do the work of spiritual power? In other words, can kriegsspieler conquer kriegsspieler? We answer No. They may win victories over each other; but they cannot conquer. There is nothing to conquer. Belligerents led by kriegsspieler must fight on, if their performances deserve the name of fighting, until one side is financially exhausted, or the civil element of the nation gets disgusted and sues for peace. Kriegsspieler cannot win decisive victories. The hangman's whip is effective only to a certain point. If the adversary maintains his ground when that point is reached, the morale instantly changes from the assailant to the defender. This is the moment when both sides are whipped. The assailant confesses his condition by ceasing to advance. The defender confesses his, by failing to attack. We assume, of course, that the commanders on both sides are merely kriegsspieler. If a commanding spirit were in command on either side, hesitation would disappear in a moment. The attack would be driven home, or the counter-attack would be delivered, either of which would be decisive. But with kriegsspieler in command,

both sides will vomit musketry for a few moments, and then one side will withdraw, growling like a cur dog, and both sides will claim the victory.

The possession of superior man-killing machinery then, like the possession of superior numerical strength, is no guarantee of victory. It is the spirit that fights. It is the spirit that conquers. The royal game of war cannot be played by machinery nor regulated by any system of rules. It is a spiritual game.

Reliance upon superior man-killing machinery, that is, reliance upon weapons of great range and accuracy, is the twin brother of another absurdity which has found favor among professional men. It has been observed that, under favorable circumstances, it is possible to kill or disable men at great distances, and *long-range fighting* has become an article in many military creeds. Incidents are cited, chiefly from the last Russo-Turkish war, where Russian soldiers were disabled, and even killed, at distances far beyond the range of distinct vision, and enthusiastic kriegsspielers have accepted the fact as satisfactory proof of the effectiveness of long-range fighting. This theory is a legitimate son of that misconception which assumes that victory depends upon slaughter.

It ought to be unnecessary to argue against such an absurdity. It is a near relation of that artillery absurdity known as "shelling the woods." There is no objection to shelling any bit of timber known to be occupied by the enemy, if his presence there interferes with our plan; but indiscriminate shelling of the woods, on the bare chance of killing a few enemies, is a criminal waste of ammunition. So also musketry fire at unseen targets, or at targets so distant that the effect cannot be observed, is a waste of ammunition, which can have no effect on the issue of the contest. It is simply the barking of cur dogs which lack the courage to come near enough to bite, and will be so estimated by every courageous adversary. The side that reserves its fire until it can deliver it with withering effect, has a great moral advantage. At the beginning of an action, anticipation is more demoralizing than reality, and the wise commander gives it time to work. The French and English tactics during the Napoleonic wars, may be cited as illustrations of this. The French column of attack never collided with the English line. It was invariably demoralized by the English stolidity, and ripe for defeat before the first volley was fired. Wellington could have killed more enemies by opening fire a little earlier, but then he could not have conquered so

easily. He had a powerful ally operating in the hearts of his adversaries, and he wisely gave him a chance to work. His grand object was to conquer, not to kill.

Long-range fire, that is, fire from distances so great that the effect cannot be observed and the aim corrected, must be ill-aimed and ineffective, and consequently contemptible in the estimation of the adversary. Such fire is never deadly. But even if it did kill considerable numbers, it never can conquer. At such distances it is easy to move out of sight or out of danger, and the morale of the men will be strengthened rather than disturbed. It makes them willing to advance, and "*Forward*" is and always has been the way to victory.

"The Dispersed Order," which is the tactical answer to long-range fire, is apt to become a dangerous absurdity if not kept within bounds. Admitting, for the sake of argument, the necessity for such a formation in attack, the question, What should be the limits of the dispersion? becomes all-important. The natural and correct answer to that question is: The limits of perfect control. This leaves us little wiser than before. If the control be spiritual, the limits may be large. If discipline alone be relied on, they must be contracted.

If a sub-commander on the line—a platoon leader—relies entirely upon discipline for control, he must be within speaking distance of his men, and able at any moment to place himself alongside of any one of them. In crossing the danger zone, he will find himself fairly busy with this kind of work. Demoralization is a curable disease if taken in time. A few words spoken in a kindly tone by his commander, and especially that officer's presence and bearing, will often convert a half demoralized recruit into a steady veteran in less than a minute. But the officer must remain by him until his courage is fully restored. He is suffering from a spiritual disease, akin to buck-fever, and, for the time being, incapable of reasoning. It is useless therefore to reason with him. Kindness and example are the only cure.

In crossing the danger zone then, platoon leaders will find themselves kept reasonably busy at this kind of work, watching for the first symptoms of demoralization among the men; bracing up nervous men, now on the right, now on the left, now in the centre. If a platoon leader can carry his men across the danger zone with nerves unshaken, the deadly zone will seem less of a difficulty, because it will be crossed with a rush.

The duties required of platoon leaders determine the practical limits of dispersion. A platoon should never be extended over a front of more than thirty yards. Dispersion beyond that limit is an absurdity of unmistakable parentage.

Cover, natural or artificial, is a twin brother of Dispersion. If men be permitted to utilize it freely while crossing the danger zone, it will take a stronger power than discipline to get them to abandon it and enter the deadly zone. Again, incipient demoralization cannot be cured behind cover. If a man shows symptoms of nervousness, or a disinclination to leave temporary shelter when ordered to advance, the platoon leader should be by his side instantly. He must be called into the open, and held there under instruction until his courage comes back to him. It is astonishing how soon nervousness will disappear under such treatment. Incipient demoralization in a battalion has been cured by a few minutes of the manual under fire. It is heroic treatment; but it is effective.

In an attack the duty of the leading echelon is to get at the enemy. Every other consideration must give way to that. To open fire prematurely is a fatal error. If the enemy be behind a ridge or a parapet, the crest of it must be reached by the assailant before he fires a shot. A determined advance by a line or column has more moral effect upon troops behind cover than musketry fire could have, even if continued for an hour. Of course an enemy so posted should be well shaken up by artillery fire before the assault begins; but the advance and assault of the infantry should be silent.

But this paper has reached its limit. Perhaps enough has been said to awaken thought if not to arouse discussion. The key-note of it all is, that the art of war, as studied in the schools, is more likely to lead the student to disaster than success. The results obtained by the great masters of the art, can never be reached by kriegsspieler, however closely they follow the formulas. A real commander copies no one.

## THE POST MESS.

By CAPTAIN MORRIS C. FOOTE, 9TH U. S. INFANTRY.

**A**LMOST all reforms and new measures, whatever their merits, are severely criticised and often attacked by those who really know little about them. The post mess has come in for a liberal share of abuse before it has had a fair chance to demonstrate to the army at large whether it is better than the old system or not. It is as yet new in our army, and it is remarkable what an opposition has been developed against it, considering the small number of posts at which it is in operation and how few the officers who have had a good opportunity of judging as to its merits. Let us look at the institution as it really is, in comparison with the company mess. The principal objections made to it seem to be the following: First,—that it will deprive the company of cooks, and the necessary means of cooking independently when detached or at a small post. Second,—that it leaves a company helpless to a certain extent when ordered into the field. These two are the points that have been most harped on. Now when we come to dissect them, I think we shall find them mere chimeras, or at least very weak, if not false, reasons.

In the first place, every company commander knows, or ought to know, that the field mess and system of field cooking has nothing to do with the present company mess; none of the articles or utensils used in the company kitchen at the post are used, or should be used, in the field unless it may be the frying pan; and very little is learned of field cooking by service as a cook in the company kitchen at the post, certainly nothing that cannot be learned in the kitchen of the properly fitted and conducted post mess. Field cooking can only be properly learned in the field, that is, as nearly everything else is thoroughly learned, by practical application. The field cooking outfit, consisting of fire-irons, camp kettles, mess pans, dutch- or field-ovens, and the kits,—consisting of the knife, fork, spoon, cup, and double plate, which the men have at all times in their possession,—is not a part of the post kitchen or mess hall paraphernalia.

The field cook must understand how to dig his trench, build a

suitable fire, learn how to hang his kettles and feed his fire slowly in order to boil beans, potatoes, beef, etc., properly, and how to handle his frying pan over the coals to fry bacon; he should also know how to mix and bake bread in field ovens, and biscuit in dutch-ovens. Surely cooking on a stove in a company kitchen teaches little about this. The cooking utensils of the field outfit should always be on hand in the company store-room. As the Quartermaster's Department now furnishes a liberal supply of crockery and utensils of all kinds needed, there is no excuse for having any of the field kit in the mess-room or kitchen of the post or company mess.

A post mess if properly fitted up should have a steam plant and a large range, the former being by far the best for making soups, stews, boiling potatoes or any vegetables, etc., while the range should be used for roasts. A range is always needed in addition to the steam plant for several reasons, one of them being that meats roasted by steam are tasteless. The assistant cooks should be taught both methods of cooking, and, with a large range, if anything happens to the steam pipes or apparatus the mess is not helpless while repairs are going on.

One good citizen cook should be employed and paid by the Quartermaster's Department, and one assistant detailed monthly from each company; these assistants could learn the trade, if men of ordinary ability, by watching the chief cook, even if a regular course of instruction were not given.

One officer, who could also be the post exchange officer, should be in charge, directly responsible only to the commanding officer. A good man for the place should be selected and then he should be thoroughly backed and sustained by the commanding officer, and no interference with him should be allowed. A good non-commissioned officer should be selected as steward to assist the mess officer in keeping his accounts and in preserving order and discipline, and he should be at all times in direct charge of matters. The officer of the day should be required to inspect the kitchen and mess hall once during his tour, and be present a few minutes during each meal. He should note on the guard report for the information of the commanding officer, anything he may think wrong, irregular or defective. The officer in charge of course should make frequent inspections and be present a good part of the time, thus securing much more attention than is generally paid to company messes.

Such a plant and such a system was in successful operation a few years ago on David's Island, and I presume is still. By this system economy both in material and labor is secured, regularity and uniformity in cooking and serving meals, a well-regulated diet table and many advantages not always attainable in every company mess where there are seven or eight at one post. No invidious comparisons can be made, nor will there be grumbling and discontent because one company lives better than another. In addition to the advantages enumerated, the company commander and first sergeant are saved much worry and trouble and have more time to devote to other important matters.

It is the disposition of many human beings to want a finger in every pie that is near them, and therein consists, I think, a part of the opposition to the post mess. It is because every company commander cannot run it to suit himself, or assist at least in bossing the concern. We see so many captains who think their companies live just a little better than others because they run the mess, but these delusions are as harmless as they are fallacious.

Now as to the post mess depriving companies of cooks, and independent means of messing when necessary, let me ask first how many companies are fortunate enough to have first-class cooks that they can keep any length of time? We have all had them for a while, but the weak points in their armor were sure to develop sooner or later and then we discovered that they had left their portion of the country for their country's good, and that *chefs* were not cooking very long at army posts for thirteen dollars a month.

We have shown that our ordinary cooks could keep their knowledge, and probably increase it, by detail as assistants in the post mess.

Now let each company, when it leaves a station where there is no post mess, turn in its crockery and mess outfit to the post quartermaster, or transfer it to the company relieving it. What is the sense of a company packing up and carrying across the continent a lot of heavy crockery and cooking utensils, when the company it relieves has just packed up and carried away duplicates of it all. When each company had to purchase its mess kit, of course it had to be transported with it; but now when it is all furnished by the Quartermaster's Department why should it be carried around the country? The loss by breakage and the



cost of transportation is so much money thrown away. By transferring such property, when a company arrives at a post where there is no general mess, it will find its kitchen ready for it and the mess furniture there or in the quartermaster's store-house; then it has only to put one of its former assistant cooks in the kitchen and its own mess is established.

As to the real disadvantages or serious objections to a post mess I have yet to discover them after over two years' experience at a station where one was operated successfully, and where I was, for a part of the time, in charge of it.

I have struggled for many years with the company mess problem. The matter of getting decent cooks in every company is a serious question,—men who can handle the ration to advantage, cook food properly without great waste, and be content to stay in the kitchen any length of time. It would not be impracticable to supply a well-paid citizen cook for each large post,—it could not be done for every company.

If the post mess does not prove a success, I think it will be found to be because it is not properly conducted, and in that event the fault must be with the commanding officer and officer in charge. The commanding officer should be in accord with the system and must select a good officer to take charge, changing if necessary until he gets the right kind of a man. Then he must support him, as I have stated, against all assaults or attacks from company commanders, post quartermasters, or any "kickers"; he must allow no interference, requiring the officer of the day to make his daily inspection and not to do more. I recall an instance of rather overdoing duty in this respect in which the officer of the day, inspecting the supper at a post mess, was laboring under a slight dimness of vision, caused, I believe, by dropping his eye-glasses in a mug—or two—of beer. His olfactory nerves, however, were all right, and he discovered an odor of cinnamon in the food prepared for supper, which was in reality a kind of bread pudding. The next morning he spread on the guard report in all due seriousness that there was "Cinnamon in the hash." His report was certainly spicy if not very correct.

An officer who seriously states that the post mess system leaves a company helpless, or destroys its independent action when detached, exhibits an incomplete knowledge of the post mess as it should be conducted, or else makes a statement that

the facts will hardly sustain. Such at least is the only light in which I can view it.

There may be objections other than those given here, but I have never heard any others definitely advanced, only the general indefinite growl arising, as I have stated, from a desire on the part of many to have a hand in everything, and a feeling against taking away any old institution and inaugurating a new system.

The profits, of course, of the post exchange should be turned into the post mess, the same as they are now turned into the company messes. As the regulations allow the expenditure of the company fund only for food or articles to produce food, a company living at a post mess would not need a fund. Companies coming from other posts would of course buy into the post exchange as they do now, and the company fund they might have left on hand could be kept until they went to some post where there was no general mess. In time, if the post mess system became general throughout the army, the surplus company funds could be absorbed in the mess funds by some fair plan, or a small percentage of the post exchange profits could be given to each company if it should be found necessary to keep up any company fund at all. Of course all minor questions of this kind could be regulated to the best advantage, with fairness to all concerned.

The post bakery should be attached to the mess building and run in connection with it, and the mess officer should be the post treasurer. Thus by concentrating all kindred matters under one head they could be conducted to better advantage for all, and made to run smoothly without friction or diversity of opinion or interests. The advantages of concentration are patent to all.

It seems to me very absurd to have half a dozen, or may be eight or ten, messes at one post,—a range and all the plant, a cook, assistant cook and cook's police for each forty or fifty men. The extra wastage alone is quite an item. Every bachelor who has run an officers' mess knows that a mess for two or three costs very nearly as much as one for five or six, and the same thing applies of course for a large mess.

Among the varied experiences at posts in the "wild and lanate west" every old company commander will recall his struggles with company cooks and the mess,—his efforts to vary the diet when every morning the bill of fare slips, or book, showed

the monotonous round of "Breakfast—Hash, bread and coffee." "Dinner—Roast beef & gravy, potatoes, bread, coffee & pickles." "Supper—Stew, bread & coffee," with canned corn or tomatoes for Sunday and sometimes an effort on the part of the cook to produce some dessert, when he would point with pride to a nightmare pudding—or duff—with liquid glue sauce, or a row of wonderful "whang-leather" pies, solid masses of indigestion, tougher than a campaign hat and much more durable. This round was varied occasionally by one of those meteor cooks I have referred to, who would come in with a blaze of glory, paralyze the company for a while with artistic dishes, and then go all to pieces, or desert and leave the old round gloomier than ever from the contrast.

Now that the policy is established and is being carried out of concentrating troops at large posts, making the general mess system practicable, I, for one, trust it is an institution which, like the post exchange, has come to stay, and, with the gymnasium and other reforms, will be established at every large post, and not abandoned unless time develops some disadvantages not yet discovered, or gives us something better. Many years' experience with the company mess has caused me, and I think many others, to look with decided favor on a system that at least relieves the company commander and first sergeant of one burden.

## SOME REMARKS ON OUR NEW CAVALRY DRILL REGULATIONS.

BY LIEUT. W. H. SMITH, ADJUTANT, 10TH U. S. CAVALRY.

OUR new Drill Book defines drill to be "The Exercises and Evolutions taught on the drill ground and executed in the precise and formal manner prescribed," and later on it defines Tactics to be "The art of handling troops in the presence of the enemy, *i. e.*, applying on the battle-field the movements learned at drill." This would seem to imply that only movements necessary to the handling of troops in the presence of the enemy were requisite in drill regulations. As I thoroughly believe this inference to be correct in principle, whether so intended or not by the authors of the new drill regulations, I will proceed to discuss some of the movements contained in the new drill-book with this principle as a test, and in starting out I would like to emphasize the fact that I regard any movements at drill which would be impracticable ever to execute in the presence or vicinity of the enemy, as not only useless but pernicious; for they serve to consume time on the drill ground without accomplishing any useful result,—and we have little enough time to practice useful and practicable movements without wasting any of it on the useless ones,—but the useless movements also tend to create false ideas in the minds of the men and unthinking officers.

I have known not a few officers, of good judgment and intelligence, who regarded drill as something entirely separate and apart from tactics, that is, the handling of troops in the presence of the enemy; who seemed to think that the movements prescribed at drill were a species of puzzle, and the more intricate the movement the more delight they took in solving it and the more hairs they attempted to split over the different points in it, while the practicability of the movement, that is, whether the movement was of any use or not, never seemed to enter their heads.

It has always struck me as very strange that with all our boasted common sense and shrewdness in picking out the practical side

of everything, we should have had, ever since the War of Rebellion, in which the actors claim that everything not practical was done away with and thrown out, some utterly impractical movements prescribed in our Drill Regulations, and I can account for it in no other way than as a concession to our puzzle loving cranks just referred to. Since the Rebellion all our actual fighting has been against Indians where, in nearly every case, it was thought to be necessary to fight in skirmishing order. In this practical work the defects of our old skirmish drill were brought home to us and in the new most of these defects have been remedied, but in the mounted close-order drill, the defects not having been brought home to us in the same practical manner, most of them have been continued.

Some may think that certain movements not necessary to the handling of troops in the presence of the enemy are necessary for ceremonies and formations of this nature. Be this as it may, I think the conviction is at last taking root in our service that the fewer ceremonies that we have and the more business-like work we have in their place the better army we will have. Others may think that movements not necessary to the handling of troops in the immediate presence of the enemy are necessary for massing them just beyond his reach, but I will endeavor to show later on that there are a few simple movements prescribed in our regulations which are ample for this purpose and which are also useful for manœuvring in the presence of the enemy.

My position having been such since the adoption of the new drill regulations that I have had very little actual work with individual troops, I will not attempt any remarks on that part of the regulations dealing with the instruction of the trooper, squad and troop, except those portions of the latter which necessarily affect squadron drill. The most prominent of these are the regulation affecting the guides and guidon.

In troop drill the regulations provide that the guide may be either right, left or centre, the guidon by his position indicating the place of the guide, and the chief of platoon nearest the guide regulating the gait, the guide keeping the distance of two yards in rear of him, but at the same time regulating the direction. Is not this a case of divided responsibility? and does not the practical working show the usual result of such cases? I remember once to have been acting as the chief of the leading platoon of a squadron in column of platoons. According to the drill regula-

tions I was careful to set the gait, and riding straight to the front I neglected for several hundred yards to look to my rear to see how the platoon was coming on. When I did so, I found I was riding considerably to one flank of my platoon, the guide of which was endeavoring to keep two yards to my rear, but at the same time adhering to what he considered the proper direction.

Every one will admit, I think, that if any number of men, no matter how many or how few, be placed in line and then started forward, all of them moving straight to the front and at exactly the same gait, a perfect alignment will be kept. The secret then of marching in line is nothing more than riding straight with regularity of gait,—two things that are insisted upon above all others in continental cavalries,—while our regulations seem to deem the riding straight of such little importance that they intrust it to the non-commissioned officers, who, through the exigencies of the service, such as being absent on guard, etc., probably have the chance of acting as guides of platoons or troops two or three times per week; who usually do not appreciate the importance of this fundamental requisite of a guide, and who, from want of practice, would usually be unable to do so if they did.

If any officer thinks it a very simple and easy matter to ride perfectly straight, let him ride out on a piece of sandy ground, sufficiently soft to show his horse's tracks, for several hundred yards; or if such a piece is not available, then to some piece of bare ground immediately after a rain, and attempt to ride at a trot or gallop on some distant object, then after he has ridden several hundred yards let him stop and look back at his tracks. Unless he is more expert than the vast majority of the officers I have known, he will have little curves in his course with variations from a perfectly straight line of possibly two or three feet. This seems very little, but it is exactly such variations which cause crowding or opening out in ranks, and when this error is multiplied, as it unavoidably is when a considerable body of men march in line, it causes crowding or opening out far beyond what one would usually suppose from such a small beginning.

In this illustration I have taken the most favorable circumstances of an intelligent officer not bothered by men jostling him on either side, or having his attention distracted by the numerous things which happen to a guide in the ranks when advancing at a rapid gait. But these small errors are among the least of the

evils caused by not riding perfectly straight, especially where bodies of troops of any size are advancing in line.

Very frequently a guide in ranks when jostled, or when for any other cause he has gotten off the original two points on which he started, will take others which are not at all parallel to the original direction. In this way I have seen the direction changed as much as ten or fifteen degrees, and the guides of other troops being in ranks and consequently not being able to perceive this change of direction early enough, their troops either loose or increase their intervals, causing crowding, or else increasing the gait to close up the interval. When this thing is repeated every minute or so, both horses and men become irritated and fatigued, and of course the wavering in the line and the variations in the gait get worse and worse. This again is considering a line advancing under the most favorable circumstances, that is, advancing on a stationary object over level ground. If now we consider a line advancing on a moving object and over uneven rolling ground, which would usually be the case in war, we can easily see that all the above faults must inevitably be greatly increased.

About all that the old drill regulations required of the officers was to keep out of the way of the men in ranks; they neither regulated the gait nor the direction of the march except to give commands. The new drill regulations have made one innovation for the safety of the officers,—they have provided that the officers shall not be run down by the men, inasmuch as the officers regulate the gait; but the equally important factor of regulating the direction has been left to the men. As a consequence of the little responsibility which our drill regulations have so long imposed upon the subordinate officers, we have become the most careless riders of any civilized country. We may be roughly divided into two classes:—The oldsters, who generally ride horses as old and staid as themselves, which protest vigorously against any gait faster than a walk or a gentle amble; and the youngsters who generally ride horses that cavort and dance around and do anything else but go at the gait ordered, the youngsters in the meanwhile fondly imagining themselves to be the admiration of the multitude, and that their only business at drill is to pose for the admiration of the men as before mentioned, and to call out such commands as “Hold up your heads there,” “Dress to the right,” “Keep your eyes to the front,” “Hold that horse there,”



etc., etc., all of which the men are usually endeavoring to do, but the aforesaid youngsters having really nothing to do must of course make something.

In support of some of the foregoing statements I will instance the fact that it took something over two months daily drill to get all the officers of five troops of cavalry so that they could ride three miles at the walk and trot, with variations of less than a minute. I think it is fair to presume that it would have taken a month longer to have gotten them so that they could have ridden at the gallop with equal regularity and exactness. No attempt was made at these drills to increase or test the efficiency of the officers at riding straight on given points, but, judging from other experiences, I should say it would have taken a month longer, unless the latter training had been given simultaneously with that of cultivating the judgment of pace, in which case of course three months would have been sufficient. Now if it takes three months of drill to qualify a body of officers who attend drill six days per week to act as guides, can any one hope to properly qualify a body of non-commissioned officers who as a rule cannot attend drill nearly so often? Has not the practical working of our drill regulations for years past shown the impracticability or inexpediency of having the guide in the ranks? How many squadrons, or even troops for that matter, in our service can gallop in line a half mile or more over uneven ground and maintain a good alignment, with regularity of pace and the men well closed up without crowding or jostling each other in ranks? I think there are very few.

From my own observation and that of others, I think that out of the something like 400 regiments of cavalry now in Europe there are very few that cannot do so. I yield the palm to no one in being thoroughly American. I think European cavalries can learn quite as much from us as we can from them, but to discard a method which experience has demonstrated to be better, simply because it did not originate with ourselves, strikes me as being decidedly foolish and un-American. Our drill regulations have partly adopted a European idea,—in the extended order drill the commander of the squad is made the leader of it,—but there the adoption ends. Chiefs of platoons, troop commanders, etc., are merely made the *directors* instead of the *leaders* of their commands, except in the culminating point, viz., the charge. Troops are supposed to be drilled laboriously for months preparatory to

charging, yet when this point is reached an entirely different system of leading is introduced. Is this logical? In fact is it not decidedly the contrary? The objection is sometimes raised that an officer cannot ride straight to the front and at the same time superintend his men. If this is ever true it is due either to the inefficiency of the officer or to the want of training or practice of his horse. Officers of European cavalries manage to set the pace and direction as well as to superintend their men. Shall we acknowledge ourselves inferior to them in this vital qualification of a cavalry officer? Instead then of our present method would it not be better to have one in which, whenever the platoon was in line, the chief should be in front of the centre of it regulating the gait as well as the direction, the men keeping closed toward the centre and keeping dressed by regularity of gait and by keeping their distance from their leader, and by looking at him and towards their front instead of their flank? When the troop is in line the same principles should apply, the centre file of the troop keeping his distance from his captain, the others keeping closed toward the centre, the chiefs of platoons riding so as to keep their proper distance and interval from their captains, the men keeping dressed as before by keeping the proper distance from their officers. In case it is necessary for the captain to leave his position he points out some object in front for all to ride on.

If the squadron is in line the method would only be varied slightly in case the squadron commander does not deem it best to ride in front of the directing troop, in which case he would call out to the directing captain the object to be ridden on, when the latter would take the direction indicated and the other captains would take their direction and gait from him precisely as the guides in ranks attempt to do at present, only the captains would not only have the advantage of more experience, better judgment, etc., but also the advantage of being constantly able to see the directing guide, and any changes of direction could therefore be immediately conformed to.

This is practically the method adopted by the European cavalries of to-day with results that very few of our officers have any realization of. I have been thus prolix on the subject of guides because I regard gait and direction, or in other words straight riding and regularity of pace, as the foundation of all cavalry movements, and if we are going to attempt to be anything more

than mounted infantry I think it very essential that we make some change in our drill regulations so as to make the chief at all times the leader of his command.

Another subject that may properly come in here is the guidon. Can any one give any good reason for the existence of the guidon? The only one that I ever heard attempted was that it served to show the position of the troop and marked the rallying point in battle. But does it do this? I defy any one to pick out his guidon from that of any other troop or regiment at ten paces distance, unless the wind is so favorable as to blow the flag out at right angles or nearly so to the line of sight. Even under the most favorable circumstances one can recognize his own officers or men twice as far as he can his guidon, so that in addition to not fulfilling the purpose for which it is intended, the guidon renders the man who carries it not only non-effective as far as doing any harm is concerned but it also renders him unable to defend himself. Would any sane man voluntarily carry a guidon into a charge in actual war? If the charge were ridden home and he escaped going down in the shock, he would be at the mercy of any one of the enemy who cared to sabre him during the *melée*, in which case his guidon would possibly become a trophy for the enemy. If he threw away his guidon in order to defend himself, there would be an equal probability of its becoming a trophy for the enemy, so that in either case the guidon-bearer's position would not be a desirable one.

The first movement in squadron drill is the formation of the squadron. According to the regulations this is accomplished by the adjutant and sergeant-major first posting the guides where the right and left of each troop will rest when in line, the captains then dressing their troops up to these guides, after which the captains command "front" and the captains and guides then take their posts. The sergeant-major goes and takes post with the major, the adjutant rides to a point midway between the squadron and then reports to the latter that the squadron is formed. Are not some of the things prescribed here unnecessary and useless? In the first place is it not a rather sad commentary on the judgment and common sense of the captains that the regulations suppose them incapable of getting their troops in the proper place on the line without the aid of two of their sergeants, with the adjutant and sergeant-major? Is it not a reflection upon the captains to suppose them incapable of judging of the interval

of 8 yards, and to suppose that they cannot bring their troops up on the line so that the inner flank shall rest 8 yards from the flank of the one previously arriving, and that they cannot then dress their troops so that the line will be in prolongation of that established by the troops previously arriving? These seem very simple things which men might have learned some little time before they become captains, considering that this time varies in our service from 10 to 20 years. In the second place the major, although he has been at his post and has seen the formation taking place, is not supposed actually to take command until the adjutant informs him of the fact that the squadron is formed. Do the regulations suppose him to be blind for the time being? or incapable of being anything more than a figure-head until the adjutant informs him of something that certainly he is as well aware of before as after the information is given?

All these things, trivial in themselves, would not justify so much attention being given to them were it not for the fact that the same useless formations run through the whole squadron drill. In paragraph 111 the regulations state in regard to the manual of arms that "It is laid down as a principle that the effective use of the weapon is not to be impeded by the formalities of drill." It seems reasonable to suppose that the effective use of troops is equally as important as the effective use of the weapon, yet all through the squadron and regimental drill there are formalities prescribed which only serve to consume time without accomplishing any useful result.

Instead of the foregoing method of forming the squadron would it not be quicker and more practical for the major, when adjutant's call sounds, to direct Captain A, either personally or through the adjutant or sergeant-major, to form his troop at such a place facing in such a direction, the other troops to form in their proper places, adjutant's call being the signal for the formation of the squadron, and the major taking command at once without any useless reporting of a fact that he can see for himself. Suppose the squadron were engaged in a fight and at some stage of the action it becomes necessary to recall and reform it for the purpose of meeting some new manœuvre of the enemy. Does any one suppose that if the danger were imminent the captains would wait for the accurate placing of their guides by the adjutant and sergeant-major before dressing their troops when arriving on the line? or that the major would wait for the adju-

tant to tell him that the squadron was formed before taking command and making some movement to meet the enemy? I think not. Then why consume time with formalities on any occasion? Does it make the formation any quicker when circumstances require the formality to be dispensed with? and would not the formation under those circumstances be really quicker if the formality were never practiced at all?

The next movement in squadron drill is marching in line, but as I have discussed that subject under the head of guides I will pass on to the next, which is "alignments." If the troop officers were the guides, all that would be necessary when halting in line would be for the captains and chiefs of platoons to align themselves on those of the base troop, the men then taking their distance from their officers and dressing to the front instead of to the flank,—an operation which would merely consume a few seconds. As a matter of fact it is done so quickly in cavalry which is accustomed to dress in this way, as not to be noticeable unless one is specially looking for it. As to the correction of intervals explained under this head in the regulations, a captain that could not lead his troops without a noticeable loss of interval would certainly not be fit for his place.

In the next subject, that of passing obstacles, the authors of our new regulations certainly let their common sense guide them and for once freed themselves from some of the old useless formality. In one paragraph of four lines they dispose of a subject which occupied nearly four pages of the old regulations.

The next movement which claims attention is that described in paragraph 557, "To break into column of fours from the right or left to march to the left or right." Can any one give a reasonable explanation as to why over a half a page of our drill regulations should be encumbered with a movement like this? Is it of any practical use whatever? Perhaps I have a grudge against this movement, however, and am liable to be too severe in my judgment of it. It used to be one of the first movements in the school of the battalion in our old tactics, and partly for this reason perhaps used to be a favorite with some of our battalion commanders, for some of them did not get much farther than this in their laborious tactical studies. Many a time I have been present at the old battalion drill when the battalion commander would call out "Column of fours, break from the right to march to the left—March." Usually after the movement had been

of 8 yards, and to suppose that they cannot bring their troops up on the line so that the inner flank shall rest 8 yards from the flank of the one previously arriving, and that they cannot then dress their troops so that the line will be in prolongation of that established by the troops previously arriving? These seem very simple things which men might have learned some little time before they become captains, considering that this time varies in our service from 10 to 20 years. In the second place the major, although he has been at his post and has seen the formation taking place, is not supposed actually to take command until the adjutant informs him of the fact that the squadron is formed. Do the regulations suppose him to be blind for the time being? or incapable of being anything more than a figure-head until the adjutant informs him of something that certainly he is as well aware of before as after the information is given?

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executed, line would be formed again and the major would ride up to the captain who had led in the movement and say: "Now Captain, you did not march far enough before changing direction that time, 30 yards is the distance, Sir, 30 yards. Now, we will try that movement over again." After two or three repetitions from the right flank he would try it from the left flank, and possibly end up the drill by executing "Right or left front into line faced to the rear," and this would constitute a battalion drill, and such drills too would be commanded by men who had spent from 25 to 40 years in the cavalry. Is it any wonder then that some officers grew up under the impression that drill was something solely for the parade ground, and could not have any practical application?

It has been well said that "Custom is the most enduring force in human nature," and it certainly is in the army. I believe that any one of an analytical turn of mind would have very little trouble in tracing all the useless formality and impracticable formations contained in our new drill regulations to the influence of the old so-called "Tactics." Yet I suppose the members of the board which drafted the new drill regulations thought themselves very courageous in cutting loose from the trammels of the old,—and as a matter of fact they were. They threw overboard lots of old rubbish, but it seems impossible for any set of men to throw off all at once the influence which years of practice has had on them and to be able to judge of a movement simply on its merits.

The next subject in the Regulations calling for special notice is that comprised under the heading of "General rules for successive formations." These rules deal almost entirely with the posting of guides when the movement terminates at a halt.

When discussing the subject of guides I endeavored to show that there was no necessity for posting them, provided the officers performed the duties of guides. As to those rules which designate the place where the leading troop shall halt in successive movements, would it not be better to leave such matters to the discretion of the squadron commander?

In the next movement,—that of forming on right or left into line from column of fours,—what is the necessity for prescribing that this movement be completed at a halt? Is it not probable that circumstances would frequently arise to make it expedient for the leading troops to continue the march while the rear ones

should be coming up at an increased gait? And as a matter of fact is there any necessity for having a separate movement of this kind? Cannot the same result be accomplished by giving the command "Column right (or left)," and when the head of the column has changed direction the command "Left (or right) front into line"?

In paragraphs 562, 575 and 576, the regulations prescribe two different ways of forming right or left front into line. Would it not be better to reduce those two to one, with instructions to captains to conduct their troops up to the line in the simplest and most direct manner? In performing the movement described in paragraph 576 the configuration of the ground might render it more expedient for some of the rear troops to break into column of fours or platoons; then why not give captains the privilege of exercising their judgment? And as a principle is it not better for drill regulations to be such as to cause officers to exercise their judgment as much as possible and their memory as little as possible?

The result to be obtained is the formation of line to either the right or left front, and it seems to me that, whatever the formation of the column may be, it would be better to let the captains exercise their judgments as to the most direct and simple manner of conducting their troops to the line, provided they employed regulation methods in doing so. If they employed faulty or unnecessary measures to accomplish the result, their action of course would be open to criticism by the major, and the comparison of measures used and the subsequent discussions which such comparisons would usually provoke, would certainly have a tendency to promote quickness of judgment and decision on future occasions.

In regimental drill, squadron commanders are given similar discretionary authority in regard to manœuvring their squadrons, so why not be equally liberal with captains and their troops?

The next movement is "Being in column of fours, to form front into line faced to the rear," and of all the useless and unnecessary movements ever invented this certainly heads the list. Would any cavalryman ever think of employing it where there was the remotest possibility of being attacked by the enemy while performing it? For could not one troop of the enemy knock a whole squadron to smithereens if they should ride down on it while in the midst of such a performance? and cannot the com-

mand be put in this identical formation by other and at the same time practical movements? For instance, if the column of fours is to be formed in line to meet an enemy coming from the rear, would not the squadron commander give fours right or left about and then right or left front into line? Or if it is desired to occupy a position near the head of the column with the command faced to the rear could not the squadron commander give right or left front into line and then fours right or left about? And, in general, is it not antagonistic to all the principles of cavalry action, the very essence of which is celerity and readiness, to have any movement prescribed to accomplish which it is necessary to have the command halted? These same remarks apply to those portions of paragraphs 565 and 566 prescribing the formation into line by two movements in which part of the command is faced to rear, in that they prescribe movements which are unnecessary and not cavalry-like. The authors of our new drill regulations seem at times to have been imbued with the idea that it was their duty to see how many movements they could devise or collate instead of devising or collating those that were strictly necessary.

The next movement which I shall discuss is that described in paragraph 578, the intervening movements being covered by remarks already made. "Being in line, to change front," why could not this movement have been prescribed in a very simple way by authorizing the commands "Squadron right. March." Or if to change front and move forward, "Squadron right turn. March."

The next subject in squadron drill,—the movements in line with troops in columns of fours,—is decidedly practical and useful, the only change that might be useful would be, in forming front into line, to have the troops at close intervals (when no intervals are stated in the command) so as to be uniform with the same movement in platoon columns. There are two series of movements in the squadron drill which redeem all the others, in that they make it possible for a practical cavalry commander to handle his squadron in the presence of the enemy. These are the movements prescribed with squadron in line with troops in columns of fours and line of platoon columns. In either of these formations the squadron can advance in any direction over any kind of ground practicable for mounted troops without becoming disordered, and at any time during the advance can form line in any direction with less loss of time than from any other formations

yet devised. At the same time, when a command is formed up in either of these formations with troops at closed intervals, it is sufficiently massed for all the purposes of either the drill ground or battle-field. While to some, either of these formations may appear equally good either for quick formation of line or for facility in moving over broken ground, I prefer the line of platoon column for the following reasons:—When a troop is in column of fours, only the horses in the leading set of fours have a good view of the ground in their front, while the others are restricted to the three feet of ground between them and the preceding set of fours; and when the ground is dry and dusty the horses toward the rear of the column cannot see it at all, especially if going at a rapid gait. Under these circumstances I have seen three horses thrown by one prairie dog hole. The troop was moving at a trot over very dusty ground when one of the horses near the middle of the column stepped into the hole and fell, and one horse in each of the two succeeding sets of fours fell over him. Under similar circumstances a narrow ditch, a log, or a slight fence, might throw several horses, while when a troop is moving in column of platoons each horse would usually have at least ten yards of clear space in front of him which would enable him to clear all ordinary obstacles.

Again, when a column is moving at a gallop it frequently happens that some fretful horse jumps on the heels of the one in front of him; and, finally, any check near the head of the column of fours or any variation of gait makes itself more severely felt than in the column of platoons. For these reasons I think no gait faster than a trot should be used while in column of fours, except in cases of emergency, and that the line of platoon columns is better for manœuvring over average ground. In addition to being better adapted to manœuvring over broken ground I think the platoon is preferable to the sets of fours for the reason that it gets the smaller units more directly under their leaders.

With the column of fours for route marches, with some simple movement for massing troops from column of route, such as described in paragraph 594, and with either the foregoing series of movements, we have all the movements necessary for marching, massing and manœuvring a squadron. If to these, regulations for charging mounted and for mounted and dismounted open order fighting be added, we have all the really necessary regulations for handling the squadron.

The existence of unnecessary movements in our drill regulations would not be so detrimental were it not for the fact, alluded to in the beginning of this paper, that we have so many officers that regard drill as a mere formality of the parade ground, and that on active service and in action they would evolve manœuvres and formations out of their inner consciousness, or, in other words, to use the phraseology of these same officers, "use your own common sense." My idea is that the "common sense" should be used in making the drill regulations beforehand.

Captain Godfrey, in his account of Custer's last battle, says, in describing his action during one phase of the combat, "I dismounted my men to fight on foot, deploying as rapidly as possible without waiting for the formation laid down in the tactics." Is not this about as grave a reflection on our former system of tactics as could well be imagined? Is not this exactly what drill regulations should aim to do? that is, get the men on the line of battle in the most rapid and direct manner possible? Our old tactics, while prescribing several ways for deploying skirmishers, prescribed no way for deploying directly from column, and hence the remark of Captain Godfrey quoted above. This experience of the Captain and perhaps others of a similar nature, seems to have borne fruit, for in our new skirmishing regulations of which he is one of the authors, means are provided for deploying in the most direct manner to meet all the probable contingencies of battle, and are not the new regulations for skirmishing quite as simple as the old? The only difference is that in the new, the conditions of battle have been studied and an effort made to devise regulations which would suit those conditions.

After this had been accomplished the Board desisted from its labors and refrained from adding quite a number of other movements which might serve to consume time at drill and perhaps amuse our before-mentioned puzzle-loving cranks, but which would certainly not be very useful otherwise. For instance the board might have provided movements such as "Skirmishers right (or left) front into line faced to rear," or, "Skirmishers break from the right to form to the left, etc.," but what appears ridiculous in skirmish drill seems to some officers all right when applied to close order drill, and why? because they have always associated the idea of skirmishing with actual fighting, while close order drill is only associated in their minds with the formalities of the drill ground.

The next series of movements remaining to be discussed are the ployment into close column and the deployments into line. Of the first it may be remarked that more than one method is not strictly necessary, as on active service a command would hardly be formed in this way except from column of route, and then only for massing the troops for bivouac in case the ground was limited and the command large, or for getting the troops off the road to allow others to pass by, or for the publication of orders, instructions, etc. ; but in any case, if the enemy be in the vicinity, I think the formation in line of platoon columns is preferable.

In regard to the deployments into line would it not simplify matters to give the command "Right (or left) front into line," and thus save adding and describing another movement? Is not the deployment into line practically the same as right or left front into line, only with a different command?

The next movement, "The order in echelon," would be unobjectionable were it not for the restriction of forming line at a halt.

On the subject of charging, it seems to me that much better results would usually be attained by substituting for the charge as foragers, a charge by a line of squads. The men of each squad would then be able to give each other moral as well as physical support, and a line of squads would cover as much ground and could certainly go anywhere that a line of foragers could. To sum up what I have endeavored to bring out in the foregoing paper I would :

I. Change the present regulations regarding the guides, and make the commander the leader and guide in every case of his command, and have the men take their dressing always from the front instead of the flank.

II. Abolish the guidon.

III. Change the regulations concerning the posting of guides in the formation of line.

IV. Cull out all unnecessary and impractical movements.

V. Abolish all purely ceremonious formations.

VI. Require more constant and business-like work in place of the pompous ceremonies and aimless parade ground drill which consume so much of our time at present.

## THE FLAG OF TRUCE.\*

By CAPTAIN G. S. CARPENTER, 14TH U. S. INFANTRY.

WHEN you bear to your enemy's lines the flag of truce, you pledge in a particular form and high degree the honor of your country that you come, not to harm, but for beneficence. You call upon him to withhold his arm that he may receive a message sacred to humanity. The higher law of national honor compels him to pause and listen, however certain his aim or bitter his wrath. Truce means trust,—truth,—most scrupulous fidelity. Its flag indicates that the claims of humanity are high above the fleeting objects of the hour, and must be respected.

Daniel Webster when Secretary of State wrote the British government,—“If there is one rule of the law of war more clear and peremptory than another, it is, that compacts between enemies, such as truces and capitulations, shall be faithfully adhered to; and their non-observance is denounced as being manifestly at variance with the true interest and duty, not only of the immediate parties, but of all humanity.” It is incumbent then upon the officer who invokes this higher law, to execute it as a sacred trust, intelligently and with a solemnity scarcely short of a religious ceremony.

From the greater complexity of interests in modern life, the uses of this flag are now more common than in simpler times. Inter-communication across frontiers is multiplied. The practices of peace will be less interrupted in future wars, because of the acceptance by the civilized world of the compact known as the “St. Petersburg Declaration,” which is—“that the only legitimate object which States should endeavor to accomplish during war is to weaken the military forces of the enemy.” This permits to a greater degree between belligerents the ordinary flow of commercial and social life. Even before this, the calls upon it in internecine wars were especially numerous, as in the Rebellion, where ties, national, political, and of kindred, were disrupted.

At the threshold of inquiry we are met by the natural confusion involved in the words “flag of truce,” which commingle the sym-

\*Read before the Lyceum at Vancouver Barracks, Wash., Dec. 5, 1892.



bol with what it represents,—the flag with its office. It is not the present purpose to inquire distinctively as to truces, or as to the armistice (which is distinguished only, it would seem, as being a more formal kind of truce), for this would interminably extend our limits. Yet the truce is inseparable from the subject, for on the display of the white flag, you not only make invitation to your enemy to confer, but you also notify him that the fighting shall more or less cease, thereby necessarily commanding a truce.

The underlying principles which sanction this flag are few and simple, and since the bearer has the obvious advantage of a view of hostile ground on which he cannot be a passive spectator, suspicion is naturally awakened as to the purity of his motive. Therefore the rules deduced from these principles do not so much provide for the uses of a flag of truce, as guard against its abuse, and are designed the rather to preserve the sacred trust.

To the authorities on international law we must turn for the embodiment of the fundamental rules of intercommunication between belligerents. Although the early writers treat of truces and the armistice, and philosophically segregate them as general, particular, absolute, indeterminate, and the like, I have not found that the old international lawyers have treated of the flag of truce, *per se*. It seems first set forth to our army in Order No. 100 of 1863, for the government of our armies, prepared by the celebrated Dr. Lieber, revised by a board of officers of which Major-General Hitchcock was President, and of which General Halleck, then commanding the army, in a letter to General Rosecrans, May 22d, 1863, says, "though its provisions were carefully considered, it is very imperfect, and many questions not covered must arise."

Therein is set forth as follows:

"111. The bearer of a flag of truce cannot insist on being admitted. He must always be admitted with great caution. Unnecessary frequency is carefully to be avoided.

"112. If the bearer of a flag of truce offer himself during an engagement, he can be admitted as a very rare exception only. It is no breach of good faith to retain such flag of truce, if admitted during the engagement. Firing is not required to cease on the appearance of a flag of truce in battle.

"113. If the bearer of a flag of truce, presenting himself during an engagement, is killed or wounded, it furnishes no ground of complaint whatever.

"114. If it be discovered, and fairly proved, that a flag of truce has been abused for surreptitiously obtaining military knowledge, the bearer of the

flag thus abusing his sacred character is deemed a spy. So sacred is the character of a flag of truce, and so necessary is its sacredness, that while its abuse is an especially heinous offense, great caution is requisite, on the other hand, in convicting the bearer of a flag of truce as a spy."

These rules, imperfectly covering but a fraction of the subject, are repeated in Scott's digest and are the only authoritative publication to our army touching flags of truce.

It is surprising to find that the important work of President Woolsey, the accepted text book at the Military Academy, is entirely silent on this definite subject. This is the more surprising, since the flag of truce is treated as a distinctive topic by the Brussels Conference. This celebrated conference, summoned in 1874 by the Russian Emperor, attended by the civilized powers and acceded to by them, set forth a project of international rules on the laws and usages of war.

Wheaton's American work on international law, the standard both in England and here, remarks as to these rules of the Brussels Conference, "though not absolutely binding, are of immense value in exhibiting the prevailing ideas in a definite form." In the latest edition, edited by Boyd, such as pertains to flags of truce, are as follows, viz.:

"Art. 43. An individual authorized by one of the belligerents to confer with the other, on presenting himself with a white flag, accompanied by a trumpeter (bugler or drummer), or also by a flag bearer, shall be recognized as the bearer of a flag of truce. He, as well as the trumpeter (bugler or drummer), who shall accompany him, shall have the right of inviolability.

"Art. 44. The commander to whom a flag of truce is dispatched, is not obliged to receive him under all circumstances and conditions. It is lawful for him to take all necessary measures for preventing the bearer of the flag of truce taking advantage of his stay within the radius of the enemy's position, to the prejudice of the latter; and if the bearer of the flag of truce is found guilty of such a breach of confidence, he has the right to detain him temporarily. He may equally declare beforehand that he will not receive bearers of flags of truce during a certain period. Envoys presenting themselves after such a notification from the side to which it has been given, forfeit their right to inviolability.

"Art. 45. The bearer of a flag of truce forfeits his right to inviolability, if it be proved in a positive and irrefutable manner that he has taken advantage of his privileged position to incite to, or commit, an act of treachery."

This may be said to be the compendium of the *laws of war* on this subject, as now adopted.

It is remarked by the author of the article on International Law in the *Encyclopædia Britannica*, that the uses of a flag of

truce have become limited and less likely to be resorted to by the adoption of a "distinctive flag" (a red cross on a white ground) as a flag of protection for hospitals, ambulances, and capitulations, and for those who superintend them.

This "flag of protection" was adopted by the Geneva Convention, to which our Government is now a party. On the contrary, experience is rather likely to show that a still more frequent resort to parleys will follow this attempt to mitigate the horrors of war, by the invasion of absolute neutrality within the zone of combat.

Having thus obtained the *law* from the writers and the schoolmen, let us see how the soldiers and the men of the field apply them. Who should have the power to order this flag? May subordinate commanders do so? Who should be delegated for this office? Must it be a commissioned officer? Can an enemy bring it to any point he may choose? How should it be sent? How long entertained? What times or places may be proper or improper? Should the flag have a definite size or shape? These with many other queries may naturally arise.

Both our Army regulations, and field instructions in our old and new books of tactics, ignore flags of truce. A British writer, revising an English military work, remarks that "the instructions concerning flags of truce in Part 5 of the English field exercises, although not so comprehensive as the rules promulgated by the Duke of Wellington, are evidently based on them." Not having the "Field Exercise Book" of the English army at hand, let us quote the old rules of the "Iron Duke."

*"Celerico, 1st August, 1810.*

"1. The following rules will be observed in communications with the enemy.

"2. No flag of truce will be sent to the enemy without the authorization of the General-in-Chief.

"3. Every letter to be sent with a flag of truce must, in the first instance, be seen by the General-in-Chief.

"4. The bearers of flags of truce sent by the enemy, will not pass the advanced post where they present themselves. The officer commanding this post will deliver them a receipt for their letter, and will then send them back.

"5. The officer receiving the bearer of a flag of truce should not enter into conversation with him; he should confine himself to giving him a receipt and then sending him away."

How commendable these seem. Simple, terse, and to the point. Go, do your message to your enemy if you must, then come

away. But, small armies in Spain do not have the experiences that come where a continent is the theatre.

From the numerous directions to their commands of our generals during the Civil War, I select the General Orders of two commanders of the most important armies.

HEADQUARTERS FOURTEENTH ARMY CORPS,

DEPARTMENT OF THE CUMBERLAND,

*Nashville, Tenn., Nov. 14, 1862.*

GENERAL ORDERS, NO. 16.

The following orders relating to the reception of a flag of truce are given for the instruction of the officers and men of this command on outpost, vidette, picket, and grand-guard duty, and for all other officers and men, to all of whom these details of service should be known.

It is often the object of a flag of truce to make observations of position, strength, roads, etc., for the purpose of attack or otherwise; in fact to gain all the information possible.

No person coming from the enemy with a flag of truce must, therefore, be permitted to advance further than the outposts or cavalry videttes.

If a flag of truce approach, it will be halted at the usual distance, and faced the way it came, the bearer and escort will keep ranks. A messenger will be promptly dispatched to the nearest officer of the picket or grand-guard, stating the arrival of the flag, and the rank of the officer; the officer of the grand-guard will immediately send a messenger to these headquarters, stating the road, rank of the officer, etc. He will then, with one non-commissioned officer and four men, proceed to the flag, see that it is properly halted and faced, and that these instructions are fully carried out until the arrival of the staff officer from these headquarters, who will take charge and give the necessary directions to the officer of the guard. If the bearer of the flag of truce have papers only, he will deliver them to an officer of his rank, who will receipt for them, and send the bearer on his way back. If the bearer insists on, and can give good reasons for, seeing the Commanding General, he will be met outside the lines, or a staff officer of his rank will have him conducted, blindfolded, to these headquarters.

Only the officer of the flag will be permitted to enter. The others, if they desire to come just inside our lines, will have their camp guarded by the officer of the guard, but such camp will be in a place where no observations can be made.

No conversation whatever relative to the army is permitted on the part of any officer, soldier, or citizen, with any of the party of the flag of truce.

All belonging to the party shall be treated with the greatest civility and respect.

Any violation of these orders will be promptly and rigorously punished.

Refreshments will be offered the command, and forage furnished for animals.

BY COMMAND OF MAJOR-GENERAL ROSECRANS.

J. P. GARESCHE,

*Asst. Adjt.-General and Chief of Staff.*

It may be observed that General Rosecrans' order covers only the *reception* of flags of truce, and is silent as to all that respects *sending* them. He assumed that the right to send and receive them was reserved to himself as the army commander.

A few days thereafter, an order was promulgated,—that corps commanders, and detached division commanders, may *receive* flags, and dispatch their own staff officers for this purpose, to avoid delays.

General George H. Thomas, then commanding the centre of this army, acknowledges the receipt of this order, and says, "in addition to your general order on this subject, which I have caused to be distributed, I have given verbal instructions to my officers in regard to flags of truce. I have received none, as yet. I do not believe in flags of truce, therefore do not permit or receive them." As a reason, no doubt, for this opinion, the same day he writes to Colonel Garesche, chief of staff, "I request that no more women be sent here for the purpose of passing through the lines. I consider them more insinuating and far more dangerous than men." It seems that it was necessary to emphasize the rule that the commander must control in this matter, judging from the fact that our army and department commanders had to remind their inferiors of it.

As precedents determining that this flag cannot be used at the option of subordinate commanders who happen to be in contact with the enemy without due authorization, the following cases are cited.

The punctilious General Meade, commanding the Army of the Potomac, writes General Grant, the general-in-chief, then on the field, June 5th, 1864: "Any communication by flag of truce will have to come from you, as the enemy do not recognize me in command when you are present."

May 23d, 1864. General Beauregard directs that flags of truce will only be conducted by division and brigade commanders and enjoins that division commanders see to it that these be not allowed for the mere exchange of papers and communications between pickets.

May 26th, 1864. General Beauregard writes to Major-General D. H. Hill with regard to a point for the exchange of flags of truce:—"It cannot be done now, for none can be sent to or received from General Butler. But officers bearing flags from the enemy should be stopped at a proper distance, and there made to

turn their backs to our lines." General Butler was evidently then still under the ban of outlawry from the Confederate President for his celebrated New Orleans order, that women who spat upon the uniform "should be considered as women of the town plying their vocation."

June 4th, 1864. General Butler directs General Gilmore, that hereafter no flag of truce will be sent to the enemy except by his order. General Gilmore replies, the same day, "I have never sent a flag of truce but once, and then by your permission."

When opposed to each other on the Rappahannock in 1863, General Hooker wrote to General Lee, remonstrating against flags of truce being sent to subordinate commanders, and adding, that in no case will these be received unless addressed to himself, and delivered at the usual place, under existing circumstances at Fredericksburgh. General Lee responds immediately, agreeing to this, and directing his command to send no flags of truce unless authorized by himself. Lastly, on this point, we will drop back to the 17th Century to that rigorous soldier and King, Gustavus Adolphus, whose Article of War No. 70 reads, "Whoever upon any strength more or less, holds discourse with the enemy, without our leave, our Generals, or the General of the placé, shall die for it."

But what did experience in the Army of the Potomac call forth on this topic?

*Camp near Falmouth, Va.,*

*February 27, 1863.*

#### FLAGS OF TRUCE.

The following instructions will govern communications by flags of truce :

No letters or communications will be sent over under flag of truce without the endorsement of the Commanding-General, the Chief of Staff, the Assistant-Adjutant-General, or the Provost-Marshal-General, at these Headquarters.

No citizen, officer, or soldier will be allowed to accompany the party bearing flag of truce, except those designated in orders for the purpose by General Couch, approved at these Headquarters, without a special written order from these Headquarters.

Flags of truce from the enemy will be met by the party designated in orders, and by those only, save as heretofore provided.

Flags of truce will not be sent out except for letters and communications forwarded from these Headquarters, or to meet a flag from the enemy. Newspapers may be received, but not exchanged, except under approval from these Headquarters.

After each flag of truce, the officer in charge will submit, in writing,

without unnecessary delay, to these Headquarters, a full statement of all that occurred, memoranda of conversation, and a register of the persons and papers exchanged, with the hour of date. The exchange of money, letters, or any article whatever, under the flags, except as herein provided or permitted by special order from these Headquarters, is prohibited.

General Couch will take the necessary means to satisfy himself that parties passing under a flag of truce have no letters, communications, goods, wares, or merchandise of any description, save their personal effects (which must be examined), before they are allowed to leave our lines.

The foregoing is communicated for the information and government of all concerned.

BY COMMAND OF MAJOR-GENERAL HOOKER.

DANIEL BUTTERFIELD,

*Major-General, and Chief of Staff.*

This order is directory as to the *dispatch* of flags, and merely alludes to a method, previously fixed, for their *reception*. In this respect it is the complement to the order quoted from the Army of the Cumberland, which pertained to their reception. To deduce general regulations for the government of armies from these two, would be simply a compilation, which it is unnecessary to make here. A few minor addenda would probably be necessary to their completion, such as, that the flag should be white, and large enough to be plainly visible, to avoid accidents,—that it should be conducted by officers of rank and experience equal to the importance of the present duty,—and by two officers, where one is to go within the enemy's lines,—that the other may remain at the outpost in charge of the escort,—and the like. But no order could guard against all the varying vicissitudes of war. The philosophy of this is, of course, best taught by examples from history.

The most striking example on a great scale of misuse of the flag of truce known to us, occurred in 1806. Gen Von Blucher, commanding the vanguard of the Prussian army, when pressed almost to the wall by the generals of Napoleon's army, succeeded in arresting the pressure of the nearest forces by satisfying them that an armistice of six weeks was in force. It is due to old Marshal Vorwarts, however, to add, that it is still a mooted point whether he himself then believed he was telling the truth or not, at all events, we have the following :

*" 19th October, 1806.*

" GENERAL ORDER.

" The Emperor expresses his dissatisfaction with the General of Division, Klein, and with the General of Brigade, Lasalle, and his Majesty orders that



this mark of dissatisfaction with these two generals shall be published in a General Order, in that they let two columns of the enemy which were cut off to pass, both having been so simple as to believe what the enemy's General, Blucher, told them 'that there was an armistice for six weeks.'

"Since when has his Majesty caused his orders to pass by the channel of the enemy?"

"The Emperor flatters himself that similar errors will not again be committed. Military laws require the most severe punishment against officers in such a case; but the most serious punishment for an officer of the Grand Army is not to have contributed in every point to the entire success of the operations.

"MAJOR-GENERAL BERTHIER."

Richest of all in most useful illustrations in this as in many other things to the American soldier are the ample pages of the Rebellion Record. Citations almost numberless can be made from them concerning flags of truce. These pertain, for the most part, to stipulations between opposing commanders to restrain their too frequent use, and to bring them under restrictions as to place and time for mutual convenience. But a large number charge abuses of the flag, causing controversial correspondence, often with acrimony. But one cannot fail to see, in reviewing them, how zealous the pains which are taken to maintain and preserve the integrity of this flag. It is only with the more scattered, lawless commands in the mountains or the Trans-Mississippi, where combat degenerated into guerrilla warfare, that explanations do not acquit, or the white flag seems ever to have been used as a mere *ruse-de-guerre*. A few selections may prove interesting and instructive.

The morning after the battle of Prairie Grove, Arkansas, December 7th, 1862, General Hindman, commanding Confederates, complains to General Blunt that the bearers of a flag of truce had, during the night, gathered arms from the field. To which General Blunt responded, that his, Hindman's, withdrawal of his army during the same night, his artillery wheels muffled with blankets, under this very flag, was a sufficient answer; and charges that this withdrawal, after his request for a personal interview between the commanders, was of itself a violation of the flag. General Blunt, the following day, writes to General Hindman: "I must call your attention to the abuse that is being made of flags of truce. I have never had occasion to send a flag to your lines, yet I have received several when no legitimate object was to be obtained. Hereafter flags of truce will only be sent or received by

me for the exchange of prisoners \* \* \* and also to enable you to send supplies \* \* \* to your wounded. When I send scouting or reconnoitring parties to ascertain the position of an enemy, I send them under the flag of my Government, and not with a white flag." On the next day, the 12th December, General Hindman writes under flag, "I send the bearer, Lieut. Lawrence, to the battle-field, for the purpose of making a plat of it and the approaches to it \* \* \* under such restrictions and obligations as you may see proper to impose." To which General Blunt replies on the 14th: "Your request, contained within, is a very modest one, and will be granted, provided you allow me to send an artist to your present camp to sketch it and the approaches leading thereto; such little courtesies must be reciprocated."

General Samuel R. Curtis, the department commander, in commenting on the official reports of the division commander at Prairie Grove, says, "It was a great outrage of the laws of war to cover a retreat by such use of a flag of truce." General Curtis instructs his subordinate commanders, January 5th, 1863, that permitting steamboats to trade under cover of a flag of truce is contrary to all military laws, and that parties violating are subject to trial by commission.

General Halleck writes from the Headquarters of the Army to General E. V. Sumner, March 17th, 1863, "as flags of truce are frequently used to cover the operations of spies, they never should be permitted *within* our lines."

Brigadier-General McNiel, commanding at Springfield, Mo., directs that, owing to the abuse of flags of truce, Captain Palmer, the bearer of a flag of truce, will be brought alone within four miles only of Springfield, and that his guard and attendants will be detained where they now are under strictest surveillance, and allowed to communicate with no one, but will be treated hospitably.

Under date of June 18th, 1864, Major-General Foster, commanding Department of the South, writes to Major-General Sam. Jones, commanding Confederate forces in South Carolina, that "no more flags of truce will be received within the Northern District," but all communications he desires to send, "will be received via Port Royal Ferry." Under his authority, the Commander of Folly Island, S. C., engaged in the bombardment of Charleston, directs that "if any flags of truce are sent out by the enemy, they will be immediately ordered back, and if the order is

not at once complied with, two shots will be fired as a warning, and the third at the bearer of the flag, if he does not withdraw."

On the 4th of March, 1864, Brigadier-General Truman Seymour, commanding District of Florida, explains to General W. M. Gardner, commanding Confederate forces (who had complained that a party, after having displayed a flag of truce, had fired upon his party advancing to meet it), that a guidon of a cavalry troop had been mistaken for a flag of truce, and disclaims any treachery whatever.

On May 1, 1864, in Florida, Brig.-Gen. Birney, commanding Union forces, and Major-Gen. Patten Andersen, commanding Confederates, mutually complain to each other, by letter, on the same day, of violation of flag of truce, whereby each suffers the loss of a man, whose return is demanded. And the same day each returns his captive with explanations that the parties attacking claim ignorance that a flag of truce was pending, and that rigid investigations will be made, and the culpable punished.

General Braxton Bragg, in general orders in June, 1863, says, "the enemy has prostituted flags of truce for the purpose of expelling from his lines persons guilty of crimes, and non-combatants. Hereafter, flags will not protect those guards, but they will be seized as spies or prisoners of war, as circumstances may be."

General Joe. Johnston at Haynes Bluff, in rear of Vicksburg, notifies General McPherson that he will receive no more flags of truce by the river, but they must come by his front.

It is worth observation that very little is found from General Grant, but that little is to the point.

SPECIAL FIELD ORDERS No. 2.

*February 12th, 1863.*

No flags of truce will be allowed to pass our outposts. Any message sent under it will be received by an officer and receipted for and the flag directed to return immediately. All answers to such messages will be sent under our own flags of truce.

JOHN A. RAWLINS.

General Sherman, commanding the covering army to the siege of Vicksburg, telegraphs July 3, 1863, to General Parke, within the investing lines, "if Vicksburg is going to surrender tonight, what does that heavy firing mean?" On which Parke telegraphs to General Grant, "General Sherman desires me to ask what that heavy firing at Vicksburg means?" To which General

Grant replies, "Flags of truce only covered bearer of dispatches, firing was continued by balance of lines."

After the failure of the assault on Port Hudson, May 28th, 1863, General Banks asks, under flag of truce, a suspension of hostilities to pick up the wounded. Major-General Gardner assents, provided the sharpshooters be withdrawn to 800 yards. General Banks replies that he cannot consent to withdraw, but desires to relieve suffering men. General Gardner rejoins that he wishes to relieve them, but that, notwithstanding the flag of truce, the fleet is still firing, and the skirmishers on his left; he complains besides that under flag of truce yesterday General Bank's lines were advanced. General Banks replies, that he understands after inquiry, that a flag of truce was improperly used on his right by an inexperienced officer at the time indicated, without the knowledge of his commanders; that he regrets this exceedingly as he has taken great pains to enforce the observance of the usages of war in regard to such flags. General Gardner replies politely, and the wounded are picked up after a night of horror.

Punishment for abuse of a flag of truce, or violation of the flag, is not distinctly provided for in our Articles of War. Persons in our military service would be therefore amenable only under the general article for conduct to the prejudice of military discipline.

The British Army Act of 1881, however, which now governs that army, does provide that he who treacherously or through cowardice sends a flag of truce to the enemy, shall be liable to suffer death, or such less punishment as is provided in the act; and that those who without due authority, either hold correspondence with, or give intelligence to, or send a flag of truce to the enemy, shall be liable to penal servitude, or such less punishment as provided for. Both services, however, are alike in this, that they invoke the laws of war against enemies in arms who are guilty of any of this class of offenses.

Winthrop says of the abuse of a flag of truce: "a bearer of a flag of truce who employs the same for an illegitimate purpose, as for the purpose of observing the enemy's position, numbers, etc., or who, having been halted with his flag outside of the lines, obtains access within them by making false representations; or, when admitted within the lines, abuses his privilege by false statements, secret communications, taking notes, etc., is liable to be arrested and tried under the laws of war, or, in a clear case, to be shot without

trial." He further defines a violation of a truce as "an act in contravention of the terms of the truce as agreed to, or, in an act wholly inconsistent with the truce status."

Enemies are subject to trial by military commission for such offenses.

The leading precedent in modern times is the case of the Modoc Indians, tried by a military commission and hung, for the murder of General Canby and Peace Commissioner Thomas during a truce and in presence of its flag. The formal charge was "murder, in violation of the laws of war."

The great variety of subjects of more vital importance which demand the scrutiny of the military student, sink the flag of truce into comparative insignificance, yet it is always incident to the field of conflict, or contact with the foe. The white flag has survived the black flag of no quarter, and its noble office can never cease till the red flag of battle perish, and the nations learn war no more.

Certain principles of humanity common to all mankind, except savages and pirates, bind us to its use by immutable laws. The experience of our wisest soldiers has evolved certain methods and rules for its employment. Of all this no officer can afford to be entirely ignorant.

It is surprising then, that our Military Academy does not teach the primary lesson, nor our regulations how to apply it.

## APPRENTICE SCHOOLS FOR THE ARMY.

BY CAPTAIN GUY HOWARD, Q. M. DEPARTMENT, U. S. A.

**I**N order to provide young men qualified to fill some of the forty-five hundred places of non-commissioned officers of the army, particularly those with the higher wages, an apprentice system has been proposed, taking it for granted that if an apprentice after his training does not wish to continue in the service, the Government is benefitted by having added a little to the education of a boy and given him the rudiments of a military training by which our country will usually profit in time of war.

No expectation of a commission should be held out. It is honest workmen, reliable watchmen, faithful laborers, and a few clerks that are required, not students, professional men or college professors. Men who not only do not expect an extended sphere, but who are contented with a less brilliant though possibly an equally happy lot.

To his annual report of 1890 the Inspector-General of the Army appended several letters from army officers on this subject. The essence of the various plans proposed is to establish several manual training schools, to which boys from sixteen or seventeen to nineteen years of age can be appointed. To equip the schools after the plan of the navy training school at Coaster's Island, keep the boys two years under training, and then if proficient send them to a regiment for one year. Then they are to elect whether or not they will remain in the service for two years more. After that they may reenlist or not as any other soldier.

The demand for non-commissioned officers is such that these young men, if worthy, would seldom fail of appointment as corporals upon joining regiments.

For appointment to the schools a primary requisite must be good character. Major Sanger in his report on this subject says: "Boys who are already addicted to vice, who are what are known in our cities and towns as hoodlums or fast boys, should not be accepted, no matter who applies for their admission to the school. In no sense whatever should this institution, if established, be

treated as a reformatory for bad boys. The very moment such an impression becomes prevalent no good boy will care to enter it, and we shall have a set of incorrigibles to train, who, should they enter the army, will add to, rather than detract from, the demoralizing influences which now beset it. Admission to the school should be an acknowledgment of the good character of the apprentice, and his honorable discharge an avowal of his integrity."

Dishonorable discharge in addition to any other punishment must be insisted upon for all offenses showing bad character.

In elaborating more fully the plan it must be observed: First. That the army, even at its present strength, requires between five and six thousand new men each year. A good proportion of the vacancies occur in the grades of non-commissioned officers, who, having saved a little money, established a good character, and gotten into a new country, when discharged start in civil pursuits and make some of our best citizens.

Second. No difficulty will be experienced in getting the youths desired even to the number of three thousand per annum. General Tidball says: "The age proposed is that when parents and guardians are most anxious to procure positions for their sons or wards, and when they are most perplexed to know what to do with them, the age being that of adolescence, when the individual is too old to remain longer at home and yet too young to be entirely cast adrift. The proposition offers a good education and an opening to an honorable calling. It is the age, too, when youths are fascinated by the military and take to its training with avidity." It is not a plan to entrap unsuspecting youths into an arduous military servitude, but it is the boon of a two years' school discipline and one of special training to be a man. It may be well to limit and distribute the appointments by allowing each member of Congress to designate ten young men annually, if he so desire, vacancies unfilled in this way to be filled by the Secretary of War.

Third. Besides the requisites of good character and bodily health all appointees ought to be sons of American citizens with the purpose of Americanizing our army. Our tendency, following the example of Rome in its decadence, is to neglect this; to seek to throw our military service in a great extent upon the foreigner, the negro or the Indian, because he looks upon service in it as a privilege and an honor. Though our sovereignty does



rest on the people, all boys cannot be rich or powerful ; some must fill the humbler positions. So the privilege of a military manual training school, with the privilege of army employment if the boy does not see his way to do better, ought to appeal to the wisdom of our people.

Fourth. To clear the ground by excluding what they should not be, they should not be classical or scientific schools. Efforts to establish the naval apprentice system, now so successful, failed for fifty years, and the Secretary of the Navy in 1875 said : "They have failed owing partly to the very elaborate system of education and training adopted, and partly to the fact that inducements were held out to the boys which could not be realized." The inducements were that they might become naval officers, which were so remote to all and impossible for most as to cause discontent and desertion.

It must not be an apprenticeship to any of the trades, except incidentally, but to the art of being a man and a good soldier. Major Woodhull, Surgeon, U. S. Army, says : " If the trades are thoroughly taught there will be little time left or taste developed for military matters proper, and almost certainly these skilled mechanics will drift at once into civil life, and the question will be properly raised whether it is the province of the Government to take lads, pay them wages, and teach them at public expense a mechanic art. On the other hand, if they are not taught thoroughly they will pass into the army imbued with the idea that " good enough " work for a few hours a day is all that is required of soldiers.

" Should it be thought well to educate army blacksmiths and army carpenters, there should be some positive condition by which they will be bound to serve in the army one full enlistment after they are twenty-one, and they should be taught in a separate school independent of and apart from the junior battalion, but they should all pass through that school first.

" It would be well, however, to teach every lad how to weld iron, to mend tinware, to drive a nail, to use a saw and push a plane."

Finally, three or more healthful stations in parts of the country allowing out of door work throughout the greater part of the year could be selected. San Diego Barracks, Cal., Fort Thomas, Ky., and Fort Mifflin, Pa., will serve as good examples. Where suitable quarters do not exist they would have to be con-

structed. Three selected colonels, with their regimental headquarters and bands, preferably from the infantry, could be assigned to them. Then company officers and sergeants would follow as rapidly as the apprentices are obtained.

The school curriculum would be simple military training, English studies, and manual handiness. The company officers and sergeants would be the instructors, and when they were found incompetent could be transferred away. They would usually do well. The English studies, as in the navy, would only include reading, spelling, writing, arithmetic, geography and history. The boys would have infantry drill and standing gun drill at field pieces and machine guns, fencing and gymnastics. The general use of tools of various trades could be pursued according to individual aptitude. As infantry drill is taught to all arms, it is best to confine the school work chiefly to this and allow the young men for their third year to go to the arm of the service they prefer. When destined for the cavalry they should be sent first to a cavalry school at such a post as Fort Riley, when for the artillery or engineers to Fort Monroe or Willet's Point. Those for the infantry would join their regiments.

The positions of corporals or squad leaders in the school battalions would be filled by selected boys in their second year.

A chaplain could be attached to each command to look after the religious and moral training of the boys, to be ready with friendly counsel and sympathy in time of need.

Thus far could the work go without additional legislation, but under our system advance is only rendered possible when legislative action gives executive activity the right and the means to go ahead. The legislation by Congress primarily essential, is to allow the apprentices to be in excess of the twenty-five thousand limit of the army; for in the scientific development of warfare that number is far too small to reduce still further by substituting boys for fully developed hardy men. Even now a force of more than seven thousand cannot be assembled at any one point without leaving unguarded some fortification which it is important to keep occupied, and whose armament should always be kept in order; or causing the people of the sections of our country from which the troops must be withdrawn to cry out against the deprivation of their rightful protection from Indian, border, or other lawlessness. Then of course the support of the apprentices, though at a low rate of pay, must be provided for annually.

At a former military post,—Carlisle Barracks, Pa.,—Captain Pratt has built up an Indian Training School, of which the military system is a most valuable part. In this school the veriest little savage, boy or girl, in several years becomes a civilized man or woman with a good grammar-school education. The principle of the apprentice schools is the same, but the difficulties much less.

While the Indian youths are not necessarily corrupt in morals, their code, as far as formed, is not a civilized one. They often do not even know the use of many of the simple things of our daily life, as for instance, of beds or knives and forks,—things of which we scarcely think unless deprived of them. In addition to schooling, the Carlisle boys when capable learn a trade. So this school begins farther back and carries the boy to a higher point than the apprentice system needs to. Some graduates now enlist in our Indian companies, thereby making of it a military apprentice school for them, and as soldiers they are doing well.

The Indian companies give an example of the excellence of our present non-commissioned officers as instructors. Each company of Indians, with a very limited number knowing any English was, when it started, subdivided into squads to be taught by line sergeants detailed for the purpose. Not only did they teach the Indians tactics in a foreign tongue, but how to live, keep neat, render honors, and conduct themselves properly, and now in some instances have them in school classes. In the majority of companies no interpreters were used and for patient effort, kindly treatment and persevering labor, I have seen nothing to excel the work of these sergeants.

An officer who wrote for the Inspector General an account of the naval training school, and his views as to instruction for the army, Lieut. Wotherspoon, is now commanding an Indian company. He uses words that I cannot do better than adopt: "We must not forget when we go into the market and bid for men to serve with our colors, that to get them and to keep them, of a class to be trained with modern weapons of war, we must offer such inducements as will draw them from other occupations. One of the best inducements that we can offer is to place such a man in a position where he will be respected by the nation, by his acquaintances, and by himself, and this we will do when we make him an honor to the profession of arms and the profession of arms an honor to him."

## THE MILITARY USES OF PHOTOGRAPHY.\*

BY LIEUT. A. WILLIAMS, R. Q. M., THIRD U. S. INFANTRY.

FOUR hundred years ago, while the art of printing was still in its infancy, and gunpowder—introduced into Europe by the Saracens—had but lately caused the cross-bow to be laid aside for the hand-gun, a continent was rediscovered. Had the venturesome Northmen been able to print the story of their visits to Vineland, or had on the other hand the Spaniards been unacquainted with gunpowder, modern history would have been vastly different from what it is to-day. The three great discoveries dawning upon the world together as they did, have wrought changes which are incontrovertible proofs of evolution and growth in all that pertains to humanity.

Scarce half a century has elapsed since three new agencies of human progress were announced, namely:—

The electric telegraph.

The locomotive steam-engine and iron railway.

Photography.

Men of the nineteenth century are witnesses to the wonders already accomplished by the telegraph and the railroad. How greatly these administer to our comfort, convenience, enlightenment and happiness is readily conceded, and can be easily understood by conceiving ourselves deprived of their use.

To photography, aside from the pleasure experienced in viewing pictures of friends and of places of interest, or the representations of works of art, most of us attach little importance.

Perhaps those of the nineteenth century who are amazed that mankind was so slow in recognizing the true value of the art of printing, might do well to inquire whether they do not inherit some of the obtuseness of their forefathers.

It seems to be a law of our being that the gifts which are most beneficent to the human race can be made the most potent destroyers of human life and happiness. Strange as it may appear to moralists, war has hitherto been inseparable from human prog-

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\* It is to be regretted that it is impossible to reproduce the many fine illustrations—chiefly in colors—which accompanied this article. ED.

ress, and as far as our present vision extends the future will be as the past in this respect. Nations will continue to seek to make themselves formidable to their enemies.

To this end when wars arise, every discovery and agency will be invoked by the combatants. During periods of peace military men must continue to study the military applications of new discoveries, improvements and inventions.

Of the three discoveries of the nineteenth century, already mentioned, two,—the telegraph and the railroad,—have already become recognized factors in warfare. In this paper, it will be the aim to show that although photography has not and probably never will become prominent as a war agency, yet it has military uses of no mean importance.

About the year 1800, Wedgwood and Davy commenced to experiment with sheets of white leather and paper saturated with a solution of silver nitrate. Placing upon the sensitized tissue an opaque body, for example a leaf, and exposing to sunlight, an image of the object, or rather of its shadow, was obtained. That portion of the tissue exposed to light became blackened, while that covered remained white. As the entire surface would darken on exposure to light, and as no means was known by which the silver salt could be removed, these images had no permanence. These experiments however led to those of Niepce of Chalons, which commenced in 1814. His first attention was given to the bitumen of Judea, now better known as asphaltum, named from the *lacus asphaltites* or Dead Sea. This substance when subjected to the solar rays becomes insoluble in certain essential oils. Niepce coated a plate of metal or glass with the bitumen and exposed it for several hours to the luminous image produced in the camera obscura. The plate was then washed with the essential oil of lavender. The bitumen not affected by the light was dissolved and removed from the plate, leaving an image in which the lights were marked by bitumen and the shadows by its absence. In this manner the first landscape photographs were produced. Under the most favorable circumstances an exposure of at least three hours was required. To-day an exposure of less than a two hundred and fiftieth part of a second will suffice to procure an incomparably better picture.

Later, Daguerre became associated with Niepce, and the two continued their experiments. The salts of silver, being more sensitive to light than bitumen, again attracted attention.

Finally, in 1839, after the death of Niepce, Daguerre produced the real photograph, and in the same year Dr. J. W. Draper of New York, succeeded in making a photographic portrait.

Daguerre made use of a highly polished silver plate. This on being exposed to the vapor of iodine became coated with a film of silver iodide, a substance sensitive to light. The plate was then exposed in the camera, and the image developed by means of the vapor of mercury.\* This image was fixed by dipping the plate in a solution of hyposulphite of soda, which dissolved and removed the silver iodide not affected by light. It was afterwards gilded or toned by means of a mixture of tri-chloride of gold and hyposulphite of soda. This latter treatment improved the quality of the picture and rendered it more permanent.

The discovery by Sir John Herschel, in 1840, that the sensitive salts of silver (chloride, iodide and bromide, classed as the haloid salts) were soluble in hyposulphite of soda, rendered it possible to make permanent photographic pictures. Daguerre's discovery was announced on February 6th, 1839. On the 25th of January of that year Mr. Fox Talbot made known his process, in which he employed paper coated with the iodide of silver.

Following upon these discoveries came that by Archer of collodion (gun-cotton dissolved in ether) which on evaporating, leaves a hard transparent film.

Glass plates bearing the collodion film in which certain iodides and chlorides were incorporated, were dipped into a silver nitrate, and by the formation of silver iodides and chlorides in the film, became sensitive to light. These plates on being exposed in the camera and treated with a deoxydizing agent (termed the developer) afforded a transparent negative picture, from which, by means of contact exposures, an unlimited number of positives could be printed. This constituted the old wet-plate photography, now almost forgotten. Afterwards came experiments with tannin and coffee dry-plates. Finally came the substitution of gelatine for collodion films, and the discovery by Mr. C. Bennett, in

\* It is stated that the discovery of the development by mercurial fumes was accidental. After experimenting with silver plates, Daguerre one day placed a plate which had been exposed in a camera, in his chemical closet. On taking up the plate some time afterward he was astonished to find a picture upon it, and after examination traced the cause to a vessel containing mercury which had been left open in the closet.

1878, of the rapid bromo-gelatine dry plate. The improvement in these plates has been constant, and to-day we are able to photograph the lightning flash, and obtain the images of stars which give light so faint that the eye, even when aided by the most powerful telescope, fails to discover them. Yet photography is still in its infancy.

Before entering further upon the subject it is necessary to describe briefly the process by which the ordinary photograph is obtained. It is with ordinary methods and apparatus that military men are at present most interested. It will be well to premise however that for special work, special processes, material and appliances are in use. Many of the printing processes are patented and some of them are secret.

The production of the photographic picture requires:

- 1st. The forming of the luminous image of the object.
- 2d. The procuring of a transparent negative image.
- 3d. The printing of the positive.

The luminous image is obtained in a form of the *camera obscura* (an invention of Porta of Padua, in the 16th century).

The rays reflected by the objects to be photographed are admitted to the dark chamber through a lens. These rays are focussed on a screen of ground glass which can be adjusted to different distances from the lens. Thus an image is produced which can be examined, and by properly shifting the ground glass can be sharply defined.

To obtain the negative, a sensitive film on glass or paper is substituted for the ground glass. This film having previously been carefully protected from light, is allowed to have the luminous image of the camera projected upon it for a very brief time. Then the film is removed to a dark chamber, and subjected to the action of certain chemicals, powerful deoxydizers, such as protosulphate of iron, pyrogalllic acid, eikonogen, hydroquinol, etc. The image, which has been invisible, is developed as a negative, darkest where exposed to the strongest light. When sufficiently developed the negative is placed in a bath of hyposulphite of soda. This latter substance dissolves and removes from the film all of the sensitive salts not acted upon by the light, and the developer, and thus fixes the image.

The positive is printed from the negative by exposing paper or other suitable material, coated with a substance sensitive to light, to rays transmitted through the negative. In some of the pro-



cesses artificial light is used, and in this case a developer must as a rule be employed to reveal the image. The positive picture, like the negative, is fixed by the removal of the substance sensitive to light. In some cases, as in the well-known silver print, it is necessary to use certain processes (called toning) to add to the clearness and permanency of the print.

Although photography has yet found but little direct application in war, it has attracted attention :

1. In connection with topographical surveys.
2. As a means of securing representations of the terrain from balloons.
3. In connection with the use of military pigeons.
4. As an aid in reconnoissance.
5. As an aid in heliographic signalling.
6. In enlarging, reducing and copying of maps and plans, and in connection with the "reproductive graphic processes."
7. As an aid in studying explosives, strength of metal, etc.

The first idea of any military use of photography is naturally associated with maps and map making. With the recent advances in military science, particular reference being had to the increased range and accuracy of fire-arms, and the introduction of smokeless powder, knowledge of the terrain,—of ground and its accidents,—has grown vastly in importance. Accurate general maps prepared in the time of peace may serve the purpose of planning the grand strategic movements of a campaign. When however we reflect how deficient even the best of such maps are found in arranging a practice march through a settled country in time of peace, we realize that something additional will be needed in war. The nearer the approach to the enemy, the more detailed and accurate should be the knowledge of the military features and accidents of the ground. With smokeless powders and long range rifles, natural positions for offense and defense will it is likely be hastily chosen and occupied. The commander who has the best knowledge of the ground will possess a very decided advantage over his enemy.

As a rule knowledge of the tactical capabilities of ground must be largely gained by special and hastily executed military surveys. In spite of field exercises in sketching, improved sketching cases and appliances, and of numerous manuals in French, German and English, the majority of officers view with distaste the making of the simple reconnoissance sketches required by the

Army Regulations. Consequently any means by which the topographical work can be facilitated is very desirable.

It is well known that from a map or plan showing the relative position of objects on the terrain together with contour lines, in other words from a horizontal projection, a perspective drawing can be executed. Conversely from accurate landscape perspectives, the "point of sight" of which is determined, the data necessary to construct a horizontal projection or map can be obtained.

This will be understood by any one familiar with the principles of triangulation and indirect leveling. Distances and heights are determined by calculation from known distances and observed angles.

In 1802, so Mr. Hardy informs us (Van Nostrand's Science Series, No. 72), a commission was appointed by the French War Department to enquire into the military value of perspectives. It reported as follows:—

"The commission believes it often useful and often necessary in topography, as in other arts, to add to the horizontal projection or plan, which constitutes the map, a vertical projection or perspective."

The difficulty of procuring suitable perspectives,—the camera lucida and the camera obscura being the instruments relied upon,—and the fact that they required considerable time in their use, limited their employment at first, to supplementing work by other methods. They were chiefly used in connection with explorations, especially in coast surveys.

Experiments made by French engineers, notably Laussedat in 1854 and Javary in 1864, clearly demonstrated that accurate surveys could be executed by means of perspectives alone.

Prof. Salneuve in his *Course de Topographie et de Géodesie*, 14th edition, 1869, discusses the use of perspectives, and devotes under that head 25 pages to the subject of photographic surveying. He admits that it possesses great advantages; but thinks these are balanced by certain disadvantages. These disadvantages relate, for the most part, to the wet-plate process. He is of opinion that in the immense majority of cases, photographic surveying is inferior to the ordinary topographical methods, and that it is always of itself insufficient.

The statement is made by a writer in the "Year Book of Photography" for 1884, that in 1858 the harbor of Venice was

defended by torpedoes. In a little building fitted as a camera obscura, the harbor was reflected on a table on which the positions of the torpedoes were marked in their places. A sentinel stationed inside could, by means of an electric wire, explode any particular torpedo, should he see the image of an enemy's vessel in its vicinity.

It was however not until the War of 1870-71 that perspectives appear to have found actual and useful application in war.

Col. Laussedat of the French engineers, who had been experimenting since 1854, employed his telemetrograph, an instrument consisting of a combination of the Wallaston prism of the camera lucida and a telescope. The instruments were placed in observatories located in the forts and other suitable places. By their means he obtained such exact knowledge of the works of the Germans and their progress day by day, that it surprised the whole military world, especially the Germans themselves.

Photography as a means of procuring accurate perspectives became soon after the great war a recognized military study in the military colleges of Europe. With the advent of gelatine dry-plates and the improvement of lenses and other apparatus, many of the objections to photography in the field were removed. Rapid topographical and architectural surveys by means of photography were soon announced. To-day photography is a recognized agent in surveying.

A full description of a photographic survey would far exceed the scope of this paper. Those interested will find the subject fully set forth in the treatise prepared by Lieut. Henry A. Reed, 2d Artillery, and in No. 72 of Van Nostrand's Science Series. The field work consists of measuring a single base line and taking views from stations selected, on the same plan as for ordinary trigonometric surveys. The office work consists of plotting the survey from data obtained from the views, horizontal and vertical angles, and filling in the features as shown. It is but fair to say that the French and Germans are at present far in advance of ourselves in the matter of photographic surveying.

The images used in surveying are of three kinds:

1. The ordinary landscape perspective.
2. The cylindrical perspective.
3. A panorama of the whole country obtained on a plate exposed horizontally.

The ordinary landscape photograph is a true perspective with

the point of sight at the optical centre of the lens. The cylindrical perspective is the form of image obtained by the cylindro-graph of Captain Moissard. It has the advantage of giving horizontal angles directly from the picture. The third class of image is obtained by Chevallier's camera and the instrument invented by Colonel Mangin of the French engineers.

Photogrammetry (as photographic surveying is specifically termed) in connection with the use of the stadia, will undoubtedly to a great extent displace the plane table and the chain in topographical work. In districts covered with forests, or where the country is flat and destitute of natural or artificial landmarks, both the plane table and the photograph will be equally at a disadvantage. There is however no class of surveying in which obstacles must not be overcome. The advantages offered by the photographic method for general work are portability, simplicity, rapidity and accuracy. The apparatus consists of lens, camera and tripod, and perhaps a stadia rod, a steel measuring tape and an aneroid barometer, with a supply of sensitive film, which as a rule will be of paper, together with a small note book. With the exception of the camera, which is either of special design or of the ordinary pattern provided with a spirit level and a compass, the other photographic apparatus is similar to that used by landscape photographers. When packed it can easily be carried by one person.

The field work for a general survey requires the measurement of a base line. This will ordinarily be accomplished with the aid of a tape line or chain. A small telescope furnished with stadia wires would in most cases greatly expedite the work, and might moreover be found exceedingly useful in outlining forests, fixing the position of sunken roads, etc. The remaining field work would consist of taking views from the stations, and recording in the note-book the compass bearings, descriptions of the stations, relative height of stations as determined by the aneroid, and other information considered necessary or useful. The rapidity and ease with which the work can be done, as compared with the ordinary methods of topographical field work, can be readily conceived. The office work with experienced cartographers should not take as long as by old methods.

Although photographs cannot displace the compass and sketching case for route sketching, yet they are destined to play no inconsiderable part in horseback, bicycle and foot reconnois-

sance. The camera will note accurately and rapidly whatever is in view without exposing the person of the observer. It will give reliable information as to the length and character of bridges, the width of streams, the general characteristics of country, notable landmarks, etc. It may be used from horseback, or even from a railroad train or a rapidly moving boat. The bicycle is peculiarly adapted to this kind of work, as by a very simple arrangement the "machine" can be made to take the place of the tripod, thus securing a rigid support. With the use of paper films the apparatus, necessary for reconnoissance, is exceedingly compact and portable.

The use of photography in surveys connected with civil works will certainly develop much that will be found valuable in war. The manner in which it was employed in a survey of a broad valley is thus described by Mr. Geo. W. Rafter in Anthony's *Photographic Bulletin* for 1891-92:

"A couple of years ago I had occasion to run a survey for a projected line of public works through a broad valley several miles in length. The topographical features were of such a nature that the proper location was not easily defined by the preliminary study of the ground, and, following in the line of the best modern methods in this kind of work, it was considered desirable to make a fairly complete topographical map of the valley, before deciding definitely the question of even an approximate location.

"As frequently happens in such cases the amount of money available for surveys was limited, and it was moreover necessary, for business reasons, that the work be done at once. The plan decided upon was first to pursue the ordinary methods of line surveys, by which a transit party, under the direction of a chief of party, stakes out the preliminary line as near the final location as it can be made, as a matter of judgment, without the consumption of much time in cutting and trying. The transit party is followed in such work by a leveler who takes the elevation of each station and such intermediate points as are necessary for an accurate longitudinal profile. Finally comes the topographer, and in the case now under consideration, he was provided, in addition to the usual transit with vertical circle, with an ordinary five by seven light camera, a boy being furnished to transport the same, with enough holders for half a day's work at a cost per day of 75 cents.

"The topographer's ordinary work included a series of cross-sections at the stations for the purpose of accurately defining the topography in the immediate vicinity of the survey line, and for this purpose the cross-sections were taken as often as necessary for precision. At about every fourth station the topographer took, in addition to his ordinary data at that station, stadia readings for distance and elevations with vertical circle, to prominent points in the sides of the valley, such points being, so far as possible, selected at right angles to the survey line. While the rodman was on the selected point a negative was made with the camera at the station, showing the rodman in the selected and instrumentally determined position, all of which was made a part of the record in the note-book. This was carried for both sides of the valley and a series of negatives obtained without taking a great amount of time. The rodman, with his rod held vertically, appearing in the centre of each picture, or near the centre, together with the data of his precise location on the map from the survey notes, made it very easy not only to locate on the map the position which he actually occupied, but in sketching in, with the negative before one, many other points appearing in the picture were located with a considerable degree of accuracy.

"For the whole survey the additional data obtained by such use of photography, over what would have been obtained in the ordinary work of the survey without it, cost, allowing liberally for the additional time consumed by the topographer, about \$20.

"With the data so obtained the contour map was extended in considerable detail, not only to the sides of the valley but for some distance up the hill at either side. Enough topography at the sides to show fully the reason for the location finally adopted, was obtained in this way, while to have made the same survey in sufficient detail to have shown the same thing with any degree of satisfaction by the ordinary methods of topographical surveying, would have added to the total expense between \$200 and \$300."

Photography will unquestionably play a part in future wars in connection with balloons. Military aerostats both free and captive are now recognized aids in observing country and the movements of the enemy. It is interesting to note that even with the slow wet-plates, a photograph from a balloon was taken and used for war purposes. In May, 1862, the Union Army before Richmond made use of a captive balloon. From it a photographic view was taken, showing in perspective the country from Richmond to



Manchester on the west, and to the Chickahominy on the east (about 20 miles). The James River, the other water-courses, the railroads, the ordinary roads, the marshes and the dispositions of troops were all accurately traced. Two copies were made and the pictures were divided into 64 squares, marked A—1, A—2, etc.

General McClellan had one of the copies and the other one was taken aloft by the aeronaut. The latter could telegraph what was taking place within view and easily designate the location of all movements, etc., to the general.

The perfection of rapid dry plates and lenses and instantaneous shutters, has rendered photography from free balloons a possibility, and in Europe the balloon photography has been brought to an astonishing degree of perfection.

Experiments are constantly being made with a view to securing improvements in apparatus, etc.

The results are as a rule kept secret, but what can be done may be imagined from the success of non-military aeronauts over five years ago, as shown in articles published in the *Century Magazine* for September, 1888.

It was some years ago suggested that the sun flashes of the heliograph could be readily photographed on a movable sensitive film and thus be easily read. This method was, it is understood, tried by Mr. L. P. Adams between the islands of Mauritius and Reunion in the Indian Ocean, a distance of 134 miles. It had been found that sunshine reflected by a mirror 150 miles distant could be seen through a telescope through six thicknesses of smoked glass.

It was proposed to use a device similar to the old Morse register provided with a sensitive film. Whether the experiment proved successful or not, I have not been able to learn, but it would seem to be practicable.

Military pigeons, which now have a place in nearly all of the foreign military establishments, depend for their usefulness, in a great measure, upon photography. These homing pigeons were used during the siege of Paris to supply the besieged with news from their friends outside of the city. The birds were sent out by means of balloons to Tours, Bordeaux and other places. On being released they would return directly to their lofts in Paris. The problem presented itself as to how the vast number of official and private messages could be sent, when the medium of recording



them was limited to what could be introduced into the quill of a pigeon feather. This difficulty was solved by M. Dagron, the discoverer of the photomicrograph. These minute photographs are familiar to most of us in connection with trinkets, etc., which have a very small lens set in them, through which may be seen pictures of noted places, persons, etc.

M. Dagron set to work to make by his new process minute reproductions of printed dispatches both official and private. His success was so great that the Government confided to him the mission of providing a correspondence service by means of the homing pigeons. He employed a pellicle the composition of which was secret, but which closely resembled that produced by drying collodion on a glass plate. It resembled onion skin in appearance. In a letter addressed to the *Moniteur Universel* (July, 1871), M. Dagron says: "The pellicular substance which I employ, besides the extreme lightness, offers the immense advantage that it requires an exposure of only two seconds, whilst paper (he refers to the ordinary silver paper of the photographic print) requires more than two hours.

"Each pellicle could contain the reproduction of 12 to 16 sheets of printed matter, each containing on an average, according to the type employed, 3000 messages." The lightness of the pellicles was such that 18 copies could be put on a single pigeon, giving a total of 50,000 messages and weighing altogether less than a gramme—(1-28 of an oz.). The whole series of messages, official and private, made during the investment of Paris, reached the number of 115,000 and weighed in all a little more than two grammes (1-14 of an oz.).

In order to secure delivery, as a rule, 20 copies were sent by as many different pigeons, and M. Dagron claims to have actually sent the enormous number of 2,500,000 messages during the three months of close investment.

The pellicles were rolled and placed in a quill which was attached to a tail feather of the pigeon by means of a waxed thread. At Paris these were unrolled with the aid of a little water containing a few drops of aqua ammonia, and read by means of magnifying glasses. So well was the photography done that every message was readable when projected in enlarged form from a lantern.

Considerable interest is being taken by pigeon fanciers in this country in the homing pigeon. Experiments made by our signal

service some years ago in General Miles' Indian campaigns were not altogether successful, mainly due it is understood to inexperience in handling the birds, and the ravages of hawks.

There are however pigeons in this country which have a record of over 1000 miles, and numbers of them can be obtained with records of 250 miles. Most of the pigeon lofts at present are on the Atlantic coast. In case of war with a foreign power these pigeons might be found very useful to transmit tidings from cruisers of the approach or whereabouts of an enemy's fleet. In such an event the photomicrograph may come again into use.

Whether or not photography will meet the expectations of enthusiasts as a means of executing topographical field work may be doubtful, but in map enlarging, reduction and copying, its value is already well established. The laborious methods of enlarging and reducing drawings by means of coördinates, the pantograph, squares, proportional dividers, etc., have entirely given way to the more accurate and infinitely more rapid methods depending on light transmitted through a lens to a sensitive film placed in a dark chamber. The photograph lens has been so marvelously perfected that the images produced are in the highest degree truthful, and the films, on glass especially, are so little affected by expansion and contraction on being subjected to the various baths, washings, etc., that the errors resulting can scarcely be detected by the most rigid examination with the most delicate instruments, and are therefore inappreciable.

Enlargements or reductions by photography can be made with rapidity, ease, and according to any desired ratio; and in the case of maps and plans, if a scale of equal parts be drawn on the original, distances can be measured on the copy by means of the scale, although the ratio of enlargement or reduction is not determined.

In the method of graphic reproduction, photography has its most assured usefulness to military men. The cyanotype or blue print process is familiar to almost every one. It is very simple, being founded on the fact that the red prussiate of potash can be mixed with certain salts of iron without a chemical action taking place, but that if the yellow prussiate of potash be substituted for the red an insoluble blue compound is immediately formed. The red prussiate of potash in a finely divided state, as in the film left on paper by evaporation of its solution, is transferred by sunlight into the yellow prussiate. All that is neces-

sary therefore is to coat paper, linen, or any similar substance with a combination of the solutions of the red prussiate of potash and of the citrate of iron and ammonia, and after drying, exposing the paper under a transparent drawing for a short time to sunlight, where the sunlight passing through it produces a chemical change and, on the prepared substance being washed in water, it will be blue in the places which have been solarized, while the parts covered by the drawing will be washed clean and appear white. Should blue lines on a white ground be desired the prepared paper is exposed under a negative. For procuring copies in black and white the silver papers are used. That in common use for portraits, requiring considerable manipulation and several baths and washings and moreover requiring sunlight, is seldom used for copying maps. The gelatine bromide-of-silver papers are more or less expensive, but as they afford the means of making copies by the light flashed from an ordinary kerosene lamp, and the manipulation is simple and rapid, they will no doubt be found useful for military purposes.

Should it be desired to make thousands of copies of maps, with all the topographical details, lettering, etc., from the drawing of the engineer, photography is ready to accomplish the task. Here its value is fully established. The wonderful progress lately made in illustrating books and periodicals by photographic processes is well known. Many of the methods are in a measure secret and require expert knowledge to secure results. It may however be interesting to outline briefly the method by which maps are photolithographed. A negative of the map is obtained in the usual way. A sheet of albuminized paper is coated with a mixture composed of gelatine and bichromate of potash dissolved in water. This sheet, after being dried, is exposed to solar action under the negative. In a very few minutes it is taken into a dark chamber, and a roller charged with lithographic transfer ink is passed over it until it is evenly coated. Then it is placed face upwards in a vessel of warm water. The bichromatized gelatine not acted upon by the actinic rays of the sun is still soluble, and is dissolved away, taking the ink with it; while where the sunlight has reached the gelatine it is hard and insoluble and retains the ink. After a brief time the print is treated with a wet sponge, and soon a *fac simile* of the map is obtained in lithographic ink.

A lithographic stone,—a peculiarly close textured limestone capable of a high polish,—has meanwhile been prepared. On this

the print is now placed face downward and passed through the press. On pulling the paper from the stone it will be found that the ink lines have been transferred to the stone. After being treated in the usual way the lithographic stone will now enable many thousands of prints to be taken from it.

Photozincography resembles very closely photolithography, a polished zinc plate being substituted for lithographic stone. By a modification of the process the printing can be done directly on the zinc plates, using a reversed negative.

The exceeding sensitiveness of the photographic dry plates is such that it far exceeds that of the human retina. The race horse in motion, the bird in swift flight, vessels under full sail, and the lightning flash, have each been pictured distinctly. Instantaneous photography, however, is especially interesting to military men in connection with the motion of projectiles and the study of explosives. The positions taken by the projectile in its flight and the peculiar action of the several explosives can be studied by means of instantaneous photographs.

In addition, the effect of different explosives and projectiles can be studied and comparison of photographs of the objects acted upon. Readers of the reports made by the Ordnance Boards of tests made of armor and projectiles, must have noticed how extensively photographs are now used in connection with the experiments.

Many minor uses for photography in armies have been suggested, as for instance to aid in the identification of deserters, and in connection with passes given by the provost-marshal, as suggested by Lord Wolseley in his "Hand-book."

In all the great gun factories as well as in the great machine shops, photography has its place. Krupp and Armstrong have photograph laboratories in connection with their establishments. Thus in an indirect way photography lends its assistance to the production of the materials of war.

The soldier of the line will probably never deal directly with photography, unless perchance in reconnoissance.

The imperfect presentation of these few notes have it is hoped shown that it is possible that it will have some place in warfare. It will probably never influence victories and defeats as will the possession or deprivation of railroads and telegraphs.

To what extent and to what purpose it will be used in future wars we can only ascertain, as we shall many other things connected with our profession, by waiting.

## TARGET PRACTICE.

BY LIEUT. JAMES E. BRETT, 24TH U. S. INFANTRY.

THE instructions for "Small Arms Firing" now used by the army are contained in that invaluable book, by Captain Stanhope E. Blunt of the Ordnance Department, which has since its introduction caused a revolution in rifle firing. Having given a great deal of attention to target practice, I have noticed a few things in connection with it that have impressed me with the belief that some changes might be made that would prove beneficial. Too rapid firing, erroneous estimation of distances, and incomplete instruction in rifle firing, are the principal causes of the excessive expenditure of ammunition in battle, compared with the result obtained. The average rate of deliberate fire at all ranges is about five or six rounds per minute. Battle rate tends to increase as the range decreases, the maximum effective rate being from eight to ten shots per minute. The accuracy, of course, suffers as the rate is increased beyond the average. Few men can fire ten shots per minute for twenty consecutive minutes without the right hand becoming so fatigued as almost to incapacitate them from further firing, unless allowed a few minutes rest, the result being that the longer and more rapidly they fired, the less effective their shots would be.

The weapon now in use in most foreign armies is almost perfect, and no doubt our army will soon be supplied with one equally as good, but I think better results would be obtained, and many men now classified as poor shots would become fair ones, at least, if a better system of "stocking" were introduced. I think it wrong that the stock of the rifle should be the same under all circumstances, whether for tall or short men, as the efficacy of a fire-arm depends a great deal upon the length of the stock being suitable to the arm of the man who uses it. There should be at least two different lengths of stock,—one as now issued and another about two inches shorter. The trigger pull should be not more than four pounds, as the present regulation pull,—six pounds,—is too much, and is one of the principal causes of a great deal of poor shooting, no matter what position for firing is taken.

The present vertical leaf of the rear sight should be abolished, except for expert shots, as it would be practically useless in battle because of the smallness of the aperture. An open sight should be substituted for it, retaining, however, the vernier for lateral adjustment.

The value and force of infantry consists in its fire. At present it is by its fire alone that it is enabled to repel a cavalry charge; for troops however brave and well disciplined could not, I believe, supposing their ammunition exhausted, effectually resist a body of cavalry. The use of the bayonet, therefore, is altogether secondary. Its main utility consists in imparting confidence to the soldier, and I think a mistake has been made in exaggerating its importance, as its use on the rifle while firing sacrifices many of the principal advantages of that weapon in distant conflict. For this reason I think it should never be fixed in battle unless absolutely necessary. Not only does it interfere when fixed with the line of sight, but its weight, acting upon the leverage of the whole length of the barrel, causes a depression at the muzzle, and besides wearying the arm, occasions the loss of a large proportion of shots by causing them to strike the ground long before they reach the object.

The instructions prescribed for drilling the recruits previously to permitting them to use their weapons on the target range, should be amended, I think, by having them fire a number of blank cartridges, at the discretion of the officer in charge, which would get them quickly used to the explosion and recoil of their weapon, resulting, no doubt, in their more rapid advancement toward expertness as shots. No personally selected position for firing should be permitted until the men become proficient in all positions that they would be required to take on a firing line in battle, as prescribed by the tactics.

The position, body rest, prescribed in the new "Drill Regulations," will not prove satisfactory, and should be changed and the old position substituted; *i. e.*, the left elbow under the piece and the hand at the balance, that being the position, the natural one, that ninety-nine per centum of men would take in battle, firing standing or kneeling. To enable a man to take the body rest, he is compelled to lean more or less backward in order properly to support the weight of his weapon, and this consequently renders his position unsteady. It is a position too that cannot be as quickly taken as the former. The extension of the thumb along the



stock as nearly as possible in the direction of the bore of the rifle, and the prolongation of the fire-arm, should be enforced, as it gives complete support to the weapon and enables it to be more quickly aligned than when grasped around the stock.

A recent article states that "Certain officers refuse indeed to admit the influence of previous target practice in actual fighting. They claim that in war men all fire before them at haphazard, that is to say, their value is equal. This theory is rather paradoxical, and it is far truer to say that the excitement of the fight and the intoxication of firing, will act least on him who received the most solid instructions and training—who best understands the use of his weapon and the result that may be expected from it."

I think the use of flags on ranges should not be permitted to men who have qualified as sharpshooters or marksmen. There is considerable art, combined with judgment and memory, in the use of these flags; but, in my opinion, all adventitious aids should be rejected from target practice if they are such as cannot be made available in actual service. It is of small advantage for a man to be able to hit a mark with precision if he can make no use of his skill against an enemy, or is powerless to hit or kill a running deer at from one to four hundred yards. This is true of many expert military shots at known distances, and is due to insufficient practice in estimating distances and firing at unknown distances at moving and stationary targets.

While scouting in the Indian Territory in 1885 and 1886, I had several matches in rifle firing between a few expert known-distance target shots and some Indian scouts of my command, and was exceedingly surprised at the result. I measured a distance of two hundred yards and set up a small box for a target and had them adjust their sights and fire a few rounds. The soldiers fired with their usual expertness, but the Indians were unable to hit the target, claiming that they never used sights, but estimated the distance and elevated the muzzle of their weapons accordingly. I permitted them to do so and they hit the target every time. They then selected different objects on the plain, ranging from three to six hundred yards, and fired at them with excellent results, but my men were unable to send their bullets anywhere near them until they had fired three or four shots each. This condition of affairs was due to imperfect training in firing at objects at unknown distances, as before stated. I am, therefore, of the opin-



ion that so soon as men become fairly proficient in firing at known distances, by which time they will have become familiar with their weapon, its sights, etc., they should be required to fire at running and skirmish targets at unknown distances up to eight hundred yards, which would enable them, when combined with the present system of instruction, quickly and correctly to estimate distances. I am satisfied that, if such a course of instruction were given the average percentage now made in company skirmish and volley firing would soon be doubled.

In the skirmish, volley and file firing, the result should be communicated to the officer conducting the practice after each firing, informing him whether it is high or low, etc., and by him made known to the men and they be made to correct their sights accordingly. This course, taking into consideration also the condition of the weather, etc., would prove highly advantageous, especially at eight hundred and one thousand yards, as it would give many of the men a great deal of information concerning these long ranges that they might not otherwise have an opportunity of acquiring.

A great source of annoyance, and one which materially retards the average soldier in rapidly and thoroughly understanding the proper sighting, etc., of his weapon, and causes him to shoot irregularly, is the great difference in the initial velocity of the ammunition used. I am, I think, correct in saying that it varies from 1200 to 1270 feet, the reloaded being as low as the former, and that manufactured by the Ordnance Department not exceeding the latter. Assuming that 1200 feet is the correct initial velocity, and that the rifle is to be fired at 600 yards, weather favorable, the sight would be for a direct aim at the "bull's-eye,"  $600 - 43 \text{ yards} = 557 \text{ yards}$  for this altitude (Fort Bayard, N. M.) of about 7000 feet, because of the diminished density of the air. The change, at this range, on the target in inches at the point hit being about 6.2 inches in elevation for every 10 feet change in initial velocity (requiring a corresponding change of about 5 yards in range), it follows that, should ammunition of 1270 feet initial velocity be used, it would make a difference of about 43.4 inches in the elevation of the point hit. Consequently the average soldier would miss the target several times, probably, much to his astonishment, before getting the proper elevation, unless he knew the initial velocity of his ammunition, and this is not furnished him with the reloaded. As

the majority of the ammunition used by the soldier in target firing is reloaded, the difficulty of his position is at once recognized. While the directions given for reloading are clear and explicit, yet there are many circumstances which render the reloaded ammunition inferior to that manufactured by the Ordnance Department. Neither the charging nor the compression of the powder is done in a uniform manner, and the powder is subject to variations of moisture that constantly affect its initial velocity.

The present period of two months prescribed for target practice for the purpose of ascertaining the relative standing of the men, and obtaining the figure of merit of the command, should, I think, be supplemented by requiring every man, under direction of his squad leader, to fire fifteen shots each month (excepting those months assigned for general practice), at skirmish figures at unknown distances. This practice would, I am sure, prove of great advantage to the soldier, as an absence of ten months from range firing seriously impairs his efficiency.

The device of the "Figure of Merit," as now obtained, does not, in my opinion, satisfactorily and correctly represent the probable and relative efficiency of the different organizations in battle, since the percentage of hits in skirmish firing, which will, no doubt, be the predominating kind of fire in future battles, seems to vary only about 2 or 3 per cent. in well instructed organizations. Of course it is highly gratifying to troop and company commanders to have a high figure of merit, but this result is often due to the expertness as shots of many of their men at known distances. Therefore, should similar suggestions to those herein made as to more practice at skirmish ever be adopted, a comparison in the standing in marksmanship of the different organizations could be instituted, and a conclusion drawn as to their relative efficiency in battle that would leave no room for adverse criticism. That figure of merit, if obtained as now but with the following modification, would, I think, represent the actual standing of the organizations as to efficiency:—

Multiply the number of sharpshooters by 100; the number of marksmen by 80; the number of first classmen by 60; the number of second classmen by 40; the number of third class men by 20, and the number present not firing by 0. Should a man not succeed, after a reasonable time, in becoming a second classman, he should be discharged.

## Comment and Criticism.

(The remarks under this head have, generally, been invited by the Publication Committee, which desires that, as far as practicable, these "Comments" should appear under authors' names.)

### I.

#### "The Knapsack."

Colonel H. C. Merriam, 7th U. S. Infantry.

TO settle the knapsack question there is but one way, and that is a very simple process, as it seems to me. In the first place all will agree that no army can manoeuvre and fight with baggage wagons at their heels, even in the most favorable country. It is therefore idle to talk of hauling the soldiers' immediate supply, whatever it is, in wagons, when in the presence of the enemy. Tactical reasons alone forbid it. Therefore it will be conceded that foot troops must be prepared to carry on their persons whatever they are likely to need for use, for periods of from three to eight days. In fact these are the conditions which give to an army its extreme of fighting power. The history of our Civil War is full of instances in which whole corps marched, manoeuvred and fought, for periods as above given, entirely separated from wagon trains of all kinds.

This point settled, we come next to the question, "what articles shall be carried?" On this point no one will dispute the statement that the minimum must be the armament (including one hundred rounds of ammunition), and field rations. For eight days, this would give a minimum of twenty-six pounds. Add to this the rifle, belts and canteen of water, and we shall have about forty pounds, besides the suit worn. No luxuries are included. Now, Captain Quinton complains because his men are required "by order" to carry on their practice marches certain articles which he thinks are needless, but which weigh in the aggregate much less than the actual bread and lead necessities given above.

Practice marches have no utility, except to give object lessons of actual field service in war. The manner in which they are habitually conducted makes them both misleading and injurious. Even officers of many years' experience will not see their utility, because they cannot make them seem to be substitutes for the real conditions of war, which I have correctly outlined above.

The knapsack question comprises absolutely nothing but to discover the best way to carry what the soldier must carry in war. Magazine guns and extended order fighting imply more extended marching, increased separation from trains, more ammunition, and not less bread; therefore the new conditions only increase the importance of how to carry—or "the knapsack question."

My plan for solving the question, would be to send out whole regiments in the mildest season of the year to make short marches, not exceeding ten miles a day, for periods of from three to eight days, without wagons of any kind, except the red cross ambulance. The officers of each company to be furnished one pack mule, to carry not exceeding 150 pounds, and the field and staff in the same proportion.

I am inclined to believe that the enlisted men themselves could be permitted to choose the method of carrying, as well as the articles they should carry, except ammunition, which might be reduced to the minimum for these marches. Give them an opportunity to use or reject any of the devices suggested by those inventors, who, with best of motives, have made themselves so obnoxious to some officers. The men would make mistakes of course, but they would themselves pay the penalty, and after a few marches of this kind, the majority would discover and agree upon the best method to the end, and that method should be adopted for all.

## II.

## "The Place of the Medical Department."

Major John Brooke, Surgeon U. S. Army.

THE discussion on the place of the Medical Department in the Army is becoming somewhat hackneyed, but there are points in Lieut. Williams' article in the January number of the JOURNAL which require further consideration.

And first, the idea conveyed by the language on the third page of the article, that the legitimate duties of the medical officer are confined to "the cure of military bodies." If this idea were carried out it would greatly lighten the cares and burdens of the medical officer. When the military body came to the doctor at surgeon's call, the latter would examine the body, write a prescription for such compound as he thought necessary, and ask Steward Smith—who is an enlisted man in the army, and consequently has a military status—to prepare said compounds. And if the military body were sufficiently ill to be admitted to the hospital, he would request Private Jones, also an enlisted man in the army of the United States, and having military status, to take the necessary care of the said body; and he would request Private Robinson, also an enlisted man in the army of the United States, to cook the food necessary for the sustenance of the military body. And when the aforesaid Smith, Jones and Robinson required food to nourish their bodies, and clothing wherewithal to be clothed, some officer having military rank would make out the necessary requisitions, and returns; for the name of John Doe, M. D., to such documents would not be worth the paper on which it was written. For has he not "essentially the same duties as the acting assistant surgeon, *who is a civilian*."

And the doctor would revel in sweet dreams of peace. His slumbers would be disturbed by the ghost of no letter from a young ordnance officer at department headquarters, saying that no return had been received at his office for two Springfield rifled muskets, muzzle loaders, calibre 58. Across his dreams would flit no visions of letters from the Quartermaster-General's office, telling him that the shoes issued to Private Jones, being hand-sewed, and not partly machine-sewed, should have been charged at \$3.17 instead of at \$3.12 (see G. O. No. 41, A. G. O., 1892); or that the cape lining issued Private Robinson on his transfer was not gratuitous, but must be charged at \$1.28 (see decision of the Secretary of War, April 7, 1892; 29029 A. G. O., 1892). For, is he not a man without military functions, whose sole duty is to cure the military bodies?

If any one still believes that the duties of the medical officer are simply the curing of bodies, he should study War Department General Order No. 5 of the present year.

The conception which pervades this paper as to the functions of a medical man, whether civil or military—that his province is simply to *cure* bodies—is an anachronism. It belongs to the heyday of astrology, witchcraft, and fetichism. The writer seems to have forgotten the fact, or never to have grasped it, that *prevention* is

the first aim of the science; and that the prevention of disease is hardly limited, except by ignorance, superstition, and folly.

The author states that his grandfather never objected to the title of doctor. I speak from memory, but believe I am safe in saying that in that gentleman's day there were hardly over half a dozen institutions in the United States that were legally authorized to confer the degree of doctor of medicine. To-day there are not more than three or four States without from one to half a dozen each; and a large proportion of these admit students without evidence of education, and turn them out as doctors after an attendance of some five months during two winters. Not many years ago, in one of the largest and oldest cities of the Union, it was only necessary to enter the building called a college, put down thirty dollars, and the man would walk out with a diploma as doctor of medicine. And his legal right to the title was as valid as that of the graduate of the University of Pennsylvania or of Harvard. Would the author's grandfather have been satisfied with the title in the company of such doctors?

The office of surgeon in the U. S. Army is a different matter. No military title can add to its dignity; there is no royal road to its portals, no open sesame to its door.

Of the four professions, law, divinity, arms and medicine, the first three are dependent for their existence on conditions of the human race which are not necessarily permanent. Should Utopia ever be reached there will no longer be lawyers or courts of justice; for there will be no criminals to punish, no laws to construe, no *meum et tuum* to explain. There will be no clergy, for every layman will be his own priest. There will be no armies, or wars; for communities will have learned to respect the rights of others as their own, and nations, in their intercourse, to be guided by a universal law of justice and peace. But medicine in its legitimate sense, the profession which aims to prevent disease, alleviate suffering, and prolong life, is founded on conditions which are inherent in the race and its surroundings; and it will continue to exist so long as humanity survives.

It is further stated in the article that "the line does not begrudge the medical staff their rapid advancement in rank and pay." This matter of rapid advancement and pay is an oft told tale, but it has never yet been properly ventilated.

To enter the Military Academy the young man must have what may be styled a good school education. He receives his academic and military education without cost. He gets \$540 a year, from which he pays his mess bill, for his clothing, books, and miscellaneous expenses. When he graduates he has saved up about \$150, sufficient to provide his complete equipment as a commissioned officer, and four years are placed to his credit for longevity pay, and whatever other benefits accrue from length of service.

The aspirant for the Medical Department of the army must pass a satisfactory examination, or furnish proof from a reliable institution, showing that he has a fair academic education, before he can matriculate at the best medical colleges of the country. He then spends three years—some now require four—before he can graduate. The necessary expense incurred during these three years, as shown by the recent experience of several young men, is about \$3500. After graduation he spends from one to two years as resident in a hospital, where his room and board are the only compensation. The expenses during this time are at least \$500, and when he gets his appointment as assistant surgeon he must spend about \$150 for his equipment. When compared with the young graduate of the line his account stands thus: Ahead, one grade in rank; behind, four years of service, and \$4150 in money. What is there to "begrudge"?

But this is not all. The young line officer, after a few years service, is sent to the post-graduate school at Fort Monroe or Fort Leavenworth, for instruction in the latest

developments in his profession, or in branches not taught in the academic course. During the two years he is there he draws full pay, and has the same allowance of quarters he would have if doing duty with his company; and if he is sufficiently ambitious he can thereafter have the title of "honor graduate" beneath his name so long as it appears on the Army Register. The science of medicine does not stand still. When the young surgeon has spent four years in the service, generally in the wild west, he feels the necessity for catching up with the times, and he gets a leave of a few months (if he can) and goes to some metropolis to brighten up. He pays for everything, for he is not furnished quarters; and if his leave is for over four months he gets but half pay for the remainder of the time. And when his leave expires he is not sent to the choice post of the army; for has he not been on leave, and had a good time? Who has reason to "begrudge"?

With rare exceptions the officers of the line and medical department have always been in perfect accord. Where it is otherwise there is a radical defect on one side or the other. They together share the same hardships and privations on the plains and in the mountains, together face the same savages who know no non-combatants, and the same pestilence that respects no rank. The medical officer has always been regarded as a member of the military family; by Napoleon, who called Larrey the most valuable man in his army; by the great leader who sleeps at Riverside; and by the subaltern, whose sick child greets his coming with a brightened smile.

And the vast majority of the line cheerfully accords to medical officers all military titles authorized by law, regulations, or the customs of service. The few, the very few, who seem to guard such titles as prerogatives almost divine, may be safely left to the ripening influences of that combination of processes known to the elder Weller as "vaith and visdom."

### III.

#### "Army Organization Best Adapted to a Republican Form of Government."

Colonel James G. Gilchrist (retired), Iowa National Guard.

THE article of Lieutenant Stuart is a very thoughtful one, and is very carefully and methodically worked out. It has a defect, however, and one that inheres to all similar articles written by professional soldiers. The defect arises from want of familiarity with the conditions of State military service. The National Guardsman is neither as perfect nor as imperfect as his friends and his enemies represent him to be. In some of the States he is a fairly good soldier, lacking only in fire discipline to make him a *good* one. There is a central weakness in the State service that must first be completely gotten rid of before any substantial change can be made in existing organizations. This can only be done by a most thorough and merciless reorganization of the staff departments, or the impotent affairs that masquerade as such. There are at least three notable defects: *First*, inordinate rank, with reference to duty, size of force, and origin of the possessors. *Second*, unnecessary numbers, out of all proportion to the ostensible duty and responsibility. *Third*, a vicious system (or want of it) in making appointments, previous service, or aptitude, seemingly having no consideration.

Take my own State, for instance: A force of some 2500 men has an adjutant-general with the rank of major-general, when the rank colonel would be more in harmony with the usual military custom. An inspector-general, commissary-general, surgeon-general, and judge-advocate-general, of the preposterous grade of brigadier-general! To this a number of colonels, such as inspector of small-arms practice, engineer, and signal officer, and the crowning absurdity of all, eighteen aides-de-camp to the Gov-



error, all with the rank of lieutenant-colonel! Now if all these gentlemen had received promotion from the line, it would be different. As it is, most of them are appointed by the governor as he comes into office, and the appointment is considered as a compliment to a friend, while very often the appointee has not only had no service whatever in the Guard, but no service of any kind. This is true of the aides, I think almost without exception. The other members of the general staff are, for the most part, men who are entitled to such recognition by previous service; but there is too much rank. The effect of this is to cheapen the whole service in the eyes of the public, for the gentlemen so complimented are not content to accept their commissions as a compliment, but straightway procure the full uniform, assume the title, and for two years lose no opportunity to appear in public in and out of season.

Another serious matter is the absurd assumption of military titles, uniforms, and organization by benevolent societies of all kinds. I saw a man in a hotel-lobby, not long since, wearing a general officer's overcoat. After cudgelling my memory to discover, if possible, who he might be, lo! it turned out he was a brigadier-general of some kind of "Knights," and I was told, on good authority, that on certain occasions he had been seen in the full uniform of a general officer of the army.

Possibly the above may seem hardly *apropos* to the subject-matter. Well, it is, notwithstanding, and in this way: The State military service is barely tolerated by the people, first because they are not generally convinced that such an organization is needed, and secondly because the officers of high rank are manifestly out of all proportion to the rank and file. It does the Guard a damage to scatter lieutenant-colonels all over a State, by cheapening the thing they represent. No reform is possible in State organization in advance of popular opinion. Discourage the ostentatious part of it, make the force eminently a purely military one, model it strictly on the national army, and *then* we can go a step further. Here is the work laid out for our own reformers. Elevate the people, but be sure and eliminate the grotesque element first, as something that must stand in the way of this process.

When this is done, when we have a staff just sufficient in numbers for the actual force, with rank proportionate to the size of the organization, appointed by promotion from the line, and with all taint of politics removed, we have made a big step. The next step should, I submit, be something in this wise:

A board of army officers should be assembled to study exhaustively the strategic problems, and prescribe a force necessary to meet possible contingencies. Next distribute this force, as nearly as may be, with reference to these problems, giving due attention to population and means of communication. After this comes the great question, how to get and organize this force. Here the army man has much to say, and the guardsman perhaps as much. One has practical knowledge of troops and the other knowledge of public opinion. Therefore there must be a new board, or organization, and both these classes must be represented therein.

So I return to the beginning, and reiterate, because I know what public feeling on the matter is,—commence by cutting off all the absurdities in our organizations; let there be no room for the barest suspicion of the combination of party politics, and thereby put the great "public" in a favorable position to judge us more justly, and the rest will come. Some may think this making a mountain out of a mole-hill. But not so. I have had too many opportunities, and the fact has been pressed on my attention too often, to doubt for a moment, that the great obstacle to our enjoying full popular favor, is the host of "Generals" and "Colonels" that are so innocent of military knowledge, training, or instinct. To many the whole thing smacks of the old "Militia," and the opinion will remain general until we have a staff for *work*, with full knowledge of their duties.



**Captain Frank C. Irvine, 17th Inf., Ohio N. G.**

Lieutenant Sidney E. Stuart's essay in the last number of the *JOURNAL* is one that concerns the officers of State troops as much, if not more, than it does those of the regular army, and it would seem proper, therefore, that they should take part in the discussion of it.

It is conceded by all thinking officers of the State service, that improvements, embracing radical changes, are absolutely necessary for the perfection, in organization and efficiency, of the State troops. Here I speak particularly of Ohio, but doubt not that this is the case in nearly all the great commonwealths of our country. Just what changes however, will suit our form of government, State and National,—taking into consideration cost and effect, and the fact that while the National Guard must be at times a reserve police force, it will ultimately be the first line of the army in case of war,—does not seem clear to the writers whose effusions I have heretofore read.

Lieutenant Stuart's suggestions strike me favorably in most respects, but in my opinion both of his plans of organization lack that most essential requisite,—the harmony of the entire system.

In this country in time of peace any military establishment must be recruited voluntarily, and must, as Lieutenant Stuart properly remarks, meet with the approbation of the people. Whoever proposes the people must dispose. Army officers may be alive to the need of a thorough and efficient military establishment, but when that organization conceives the connection of the militia with the regular army, they are, through their education, training, and remoteness from the people, without the conception of the means to obtain it.

Those who are best calculated to judge of the possibilities of militia organization and efficiency, are those who have labored so successfully against untoward opposition, for the recognition by the general government of the National Guard.

Of all the personnel of the Guard, the company officers, especially company commanders, are the ones whose opinions should be ascertained. There is a prevailing impression, however, that the field officers are the embodiment of military knowledge, and they are, in consequence, most influential in legislative circles.

The one serious objection I see to Lieutenant Stuart's system is the loss to the State of the control of its reserve police. Ohio is now considering the general organization of the Guard into brigades and divisions with a suitable staff for each. This movement seems wise, if any great degree of efficiency is to be secured to the State from the regimental organizations when they are called into service as a body. But then how are both Federal and State control to be reconciled if either of Lieutenant Stuart's plans are adopted?

I am most heartily in accord with him in his advocacy of examination and appointment of militia officers. We cater too much to our men. Plausible words or political trickery more often secure a place on the official register than do the soldierly qualifications of an applicant for election. Longingly I look for the day when the assimilation of the Guard officer with the Army officer may be complete, but it cannot come until the standard of the former is raised to that of the graduate of West Point. The ward politician with military tendencies must go.

**A. E. Dickinson, M. D.**

The very interesting article on Army Organization by Lieut. Stuart, published in the March number of the *JOURNAL*, M. S. I., has been read with great interest and care. Will you permit one who, although a layman, has very great interest in military matters, to state that Lieut. Stuart has either overlooked or else not realized the im-

portance of the military schools in the United States in furnishing a well drilled body of men, from which in time of need the regular army or National Guard could be recruited on short notice.

In the July, August, and September numbers of the *Outing Magazine* there appeared a very able article written by Lieut. W. R. Hamilton, 5th U. S. Art. on the Military Schools of the United States. This article was written at my suggestion and the statistics as regards military schools were prepared by me. From such statistics it appears that in governmental schools,—that is, schools that have an officer detailed as instructor by the War Department,—there are about 15,000 cadets under drill, and in private schools there are some 7500 more, making something over 22,000 in all. It has been the observation of the writer, and in this he thinks he will be borne out by the experience of others, that very many of these schools furnish better discipline and drill than is found in the National Guard. Their instruction is more thorough, discipline better, and their military spirit is far greater than in the National Guard. About 50 per cent. of these students or cadets leave school every year, consequently it may be said that over 10,000 young men are going into private life yearly that have been drilled and disciplined to an extent not equalled outside of the regular army. Out of this 10,000 young men there are very many that would not only be good soldiers but would be capable of becoming non-commissioned officers, and in many cases commissioned officers should their services be needed. In considering therefore on what the Government may rely for its first line of defense, I do not think that Lieut. Stuart should overlook the importance of these well drilled young men. They will certainly cut a figure in any future war in which this country may become involved.

Not long since the writer had brought to his attention the fact that on a certain occasion sixteen cadets out of a military school went into camp with the National Guard company to which they were attached which thus became the best drilled in the regiment. Occasion came where the officer in command wished to drill the regiment by the bugle, and this company, in fact these sixteen young men, were the only men in the regiment that could drill by the bugle. and they led the regiment and were used to instruct it.

Having had possibly as much opportunity to inspect the military schools of the United States as any other one man, or at least any one of whom the writer has knowledge, I do not hesitate to say that the cadets of the military schools of the United States in the main are superior in discipline and drill as an organized body to the National Guards, and in some schools they are so superior that no comparison can be made except to the disadvantage of any company of the National Guard, with the exception of a very few crack companies or regiments.

#### IV.

### "Queries on the Cavalry Equipment."

Capt. G. H. G. Gale, 4th U. S. Cavalry.

**I** CONSIDER it a good omen that Lieut. Cole's recent article has provoked so much discussion, and the results of this will be beneficial, not only to the officers concerned, but to the mounted service in general. There is no doubt that, generally, the supply departments have dealt honestly and considerably with the line, and it is mostly true that the reason why changes, advocated by large numbers, have failed to obtain, is because there is no consensus of opinion as to what those changes should be.

The cavalry equipment might, with advantage, be altered in a number of particulars. As regards the horse, there is a decided unanimity of opinion that the United

States gets less for its money than any private individual or corporation would do under similar circumstances. It is doubtful if any European nation puts up with such poor stock, unless compelled by dire necessity. As regards the saddles, it must be remembered that they must be selected with a view to the greatest ease and endurance of the greatest number, and I doubt if many of the cavalry officers who condemn the McClellan saddle, can suggest one that will fulfill these requirements as well. I have ridden this saddle for many miles, and my experience has been that the farther you go the easier the saddle. The average rider must expect to get chafed occasionally, as the pedestrian must get sore feet, but it is not always on account of his gear. If the troop is fortunate enough to have a saddler who is capable of making the alterations, I can see no good reason why minor changes in the fit of the saddle should not be made, as in other articles of the equipment, but these, as in the others, should be made with a view to fitting it to the horse or rider in each individual case and should not, if possible, affect the general uniformity of the whole. There are good arguments for and against the double cinch. Why cannot this matter, also, be regulated in the troop? There are many horses that do not need the double cinch sufficiently to make it desirable to cumber them with its weight, and their riders with the extra responsibility and care. To put it on such horses would be like requiring all men to wear spectacles because some must do so.

The present saddle-bags are atrocious. They are a compromise between the small pockets issued some fifteen years ago, and which weighed nearly as much as their limited contents, and the broad, generous ones which succeeded them. I think, as regards capacity, they should still be diminished. The soft leather bag is very pretty at inspection, when new and flat, but after it has been used in the field and packed, it soon becomes ugly, foul, and undesirable in every way. I have used for years, a small bag of duck, about 31 inches long and 9 inches wide, with an opening in the centre 12 inches long, placed like the mouth of the old bed-sack. This is small enough to put inside the blanket roll and, if necessary, can be strapped to the saddle by itself. It is amply large enough to contain the authorized baggage of the soldier, and, when soiled, can always be washed clean. Its adoption would do away with the weight of the saddle-bag and would certainly not increase the discomfort of the soldier. If made of a good quality, light weight duck, it would wear well and protect its contents nearly, if not quite, as well as the leather saddle-bag.

As a rule, there is no complaint against the present bridle except as regards the bit. It is unfortunate that the original Shoemaker model should have been so perverted. The so-called "Shoemaker" bit costs \$2.15. I have the catalogue of an importing house which offers a straight-cheeked, polished, Daniel bit at \$44.00 a dozen or \$3.67 each. If purchased in large quantities, I have no doubt that much better figures could be obtained. Now, for a troop of cavalry, the expense of an outfit of bits of this model, would be, at the most, \$220.00, or \$91.00 in excess of the cost of an equal number of the present issue. I presume that an average of ten of those now in use are bent or broken annually in each troop, thus entailing on the government an expense of \$21.50 to replace them. If the Daniel bit were to be used but one year, I am satisfied that not only would there be little or no breakage, but the difference in expense of less than \$70.00 would be more than made up to the government by the diminished deterioration in value of some of the horses and a positive increase in value of others. I do not take into account any breakage of the Daniel bits because, as a rule, they last a lifetime. No doubt a bit of domestic manufacture, as good as the Daniel, may be procured for less money, but, so far as I am concerned, I have never been able to find one. At all events, even paying the highest price for the best article, we would be much better off.

As regards armament, with the exception of the sabre, it seems to me that the soldier's fighting weapons should be on the man and not on the horse. The trooper is not presumed to need or use his sabre while dismounted, and can therefore well leave it on his saddle, but with his fire-arms it is a different thing. The principle of fastening the horse, rider and carbine together, as in our present system, only exceeds in viciousness our habit of putting our belt under our blouse and then tying our overcoat to it by the slings. The objection to the weight of the pistol on the body will, in great part, be done away with when we get the new arm. This new revolver is, I understand, a self-cocker; that being the case, there would seem to be good cause for raising the life premiums of cavalry officers. The old revolver is dangerous enough, but when you combine the virtues of a self-cocker with a drill which requires the finger always to be on the trigger when the pistol is out of the holster, it will require more courage to go to mounted target practice than to face a battery.

Our present drill regulations contemplate little or no dismounted service from the cavalry except on the skirmish line and at guard mounting. In the former case the manual of arms is not considered of consequence. In the latter, a modified manual can easily be devised to suit a cavalry arm. It is hoped that, when we get our new carbine, it will be adapted to cavalry use, and that after its adoption the trooper will be excused from "coming to an order just like the infantry." The present carbine is not intended for any such purpose, nor can any other short barrelled arm do any better.

The side-line is generally condemned:—If made long it does not impede the movements of the horse, and if short, it injures him. If any such paraphernalia is retained, it should be, as suggested, in the shape of a pair of light hobbles. The increasing opportunities for grazing our horses within an enclosure make the matter of herding, while in the field, more difficult than formerly, as the animals no longer of their own accord remain in a compact herd. One, by herding foot-loose, invites all the dangers of a stampede without the counter advantage of experience on the part of both horses and men. This matter will adjust itself in a few years, "when the Indian question is settled." The same remark applies, also, to the lariat. It is particularly useful in detachment work and, if discarded, would be sorely missed.

V.

### "Musketry Training and its Value in War."

Lieut. Ferrand Sayre, 8th U. S. Cavalry.

THE paper on Musketry Training and its Value in War in the January number of the JOURNAL, was read by me with a feeling of gratitude to the writer for his able vindication of those officers who have devoted a considerable portion of the past twelve years to a patient and earnest effort to improve the individual skill of enlisted men in marksmanship.

I believe that the majority of the line officers of our army belong to this class, and that they have felt that they were performing a useful and patriotic service in so doing, although I believe Captain Parker is the first officer in the regular army to say a word in defense of target practice in any of our military periodicals; while we have seen it scoffed at repeatedly and have heard the objections, that "target practice does not resemble the conditions of battle"; that "men will be so badly frightened in battle that they will be unable to apply what they have learned"; that "it does not matter whether a man can hit anything or not if only he is taught to shoot off his gun at the word of command," etc., etc., preached *ad nauseam*.

The arguments of Captain Parker and the examples cited by him seem to me to

carry conviction with them. But, indeed, many of the objections to our system of target practice (Wingate-Blunt) which I have heard, do not seem to me to be logical.

Our position and sighting drills, gallery and known distance range practice, certainly do not resemble battle, but why should they? They have been found to be useful and efficient means for teaching men how to shoot.

It is fortunate for our target practice that it does not resemble battle, for no one learns how to shoot in battle. We are told that Napoleon Bonaparte's veterans were beaten in the Peninsula by Englishmen with comparatively little experience in battle, because these Englishmen had had target practice at home and could shoot better than their opponents, and yet some of these same Englishmen fell like leaves before the rifles of our "squirrel shooters" at New Orleans, many of whom had never seen a battle. Americans were then the best shots in the world, and they practiced from childhood to old age at marks and at game.

I have no doubt that some of our recruits with one year's service know more about shooting than did some of the veterans of 1865.

Our position and aiming drills, gallery, known distance and skirmish practice are merely rounds of a ladder; they are to marksmanship what pure mathematics is to engineering.

Neither geometry nor target firing is of practical use, but as means to the attainment of certain ends they have their value.

Our skirmish practice, as graphically described by Captain Parker, does, in some respects, resemble battle firing, but that is not the only excuse for its existence.

It advances the soldier another distinct step in his progressive instruction in marksmanship and throws him upon his own resources temporarily, which is an exercise of no little value. If in battle he gets any assistance as to wind, elevation, etc., he will probably avail himself of it without special instruction. It is also a drill in collective controlled fire.

If by target practice a soldier can be given confidence in his weapon and rapidity and accuracy in the use of it, then the work done during our target season is at least equal in value to that accomplished during the remaining nine or ten months of the year in our service, especially if a daily drill of an hour and a half is kept up through the target season as was done in this department [Dakota] last year.

Practice at anything should be given under simple and easy conditions at first, though by a progressive course of instruction the difficulties ordinarily met with may be surmounted.

In order to teach a man how to shoot it is necessary that in his first lessons he should know exactly where his shots strike, so that he may know what his faults are. For this purpose the portions of our A, B, and C targets external to the bull's-eye are valuable. The target recommended by Lieut. Davis (*JOURNAL* of March, 1892), and by Lieut. Batchelor (p. 48, *Infantry Fire*) with the bull's-eye at the bottom would be little more than half as useful as our present target. Lieut. Davis and Lieut. Batchelor should remember that the soldier shoots at the bull's-eye, not at the target, and since he is taught to aim generally at the bottom of the bull's-eye, the practice which they recommend is actually carried out in our service.

It is no objection to the bull's-eye that it does not look like a man; if it were round or square or triangular it would answer just as well. The intersection or "cross" of a horizontal and a vertical line, formerly used by Tennessee and Kentucky riflemen, would be just as good if it could be seen as plainly.

There is a grave objection to the system advocated by Lieut. Davis—practising only at objects resembling men. Suppose we adopted this system and we were attacked

by an ingenious enemy knowing our system of practice. He might clothe his army with asses skins, and our soldiers having only been taught to shoot at objects resembling men we should be compelled to surrender. (This is meant for a joke. F. S.)

I do not agree with Captain Parker's opinion that less time should be devoted to known distance firing. This is the school in which recruits learn the most rapidly and whose lessons cannot be learned too thoroughly. No man is so experienced a marksman that he will not be benefitted by an occasional "known distance run," to refresh his memory and assure himself that he has not fallen into bad habits.

I indorse most heartily Captain Parker's opinion that another and a higher step should be added to our course, and I would like to see included in it both rapid firing and firing at moving objects.

I do not agree with him in his opinion that recruits should complete the whole course of firing, unless, indeed, they have attained sufficient proficiency in the preliminary steps to enable them to do so profitably. I have seen a great deal of ammunition wasted and bad habits fixed upon recruits, by compelling them to shoot out their present prescribed course when they were not prepared for it.

All practice should be progressive.

A man should not be allowed to fire in the gallery until he understood the use of his sights. He should not be allowed to fire service ammunition until he had made 70 per cent. in the gallery, nor advanced to the skirmish range until he had made 70 per cent. at known distances. Men who have attained a fair proficiency in skirmishing (say 50 per cent.) should be advanced to rapid firing and firing at moving objects. I think that it would be advisable to reduce the number of badge wearing men by making these badges indicate a higher degree of skill than at present.

In order to insure fairness to all and to prevent accusations of dishonesty, I think that the skirmish range should be plainly staked out as the known distance range is.

Attempts to secure practice over unknown distances have failed, and I think that the useful effect of firing over known distances in skirmishing is greater than over unknown distances.

I do not think that the ideal course of target practice laid down by Lieut. Davis (JOURNAL of March, '92) would ever teach any man how to shoot. Lieut. Davis would teach a man to read Greek by setting him to work at reading Greek—most of us need a little preliminary work on the alphabet and grammar and an occasional reference to the lexicon.

Lieut. Davis tells us that we have "no target practice except for record," yet he will probably admit that it has produced a great many good shots and has improved the shooting capacity of our army. The true test of a system is the result it produces. If the element of emulation were taken from our target practice the practice would probably drop to the level of our listless and profitless "fours right" drills. The principle of competition should be extended to other military exercises. Our present authorized allowance of blank ammunition is abundantly adequate for all needful drill in collective controlled fire, and we have sufficient time outside of the target season for it if only sufficient interest in it could be aroused. In his Rifle Firing, Lieut. Batchelor frequently combats the idea that the results of range practice would be attained in battle. I never heard any one express such an idea and I do not believe that any one ever entertained it, and since target practice does not resemble battle there is no reason why similar results should be expected.

I have nothing to say against the proper use of controlled collective fire; the importance of keeping men well in hand and preventing waste of ammunition has been fully understood during all ages that missile weapons have been employed. But our authorities tell us that at some period—three or four hundred yards from the enemy—



individual controlled fire begins ;—it might be remarked that battles are lost or won after that period.

Lieut. Batchelor tells us (p. 14 Inf. Fire) that "our training would" "lead to waste of ammunition in battle." My own observation leads me to a directly opposite conclusion. Watching our trained marksmen preparing for competitions we see that they fully appreciate the importance of putting their cartridges where they will do the most good,—and I think that it is from untrained, inexperienced men that we must anticipate waste of ammunition.

But the gentlemen who advocate "fire discipline" so earnestly to the exclusion of all else, do not seem to be really and practically hostile to the views of Captain Parker, for when describing their pet kind of fire they tell us that the soldier should aim at the feet of the enemy with a full sight and with a given elevation, and the bullets are described as taking the elevation and direction ordered.

Of course unless the soldier had been carefully instructed by the Wingate-Blunt or some other efficient method, it would be immaterial (within wide limits) where he aimed and what kind of sight he used. The term controlled fire cannot be applied to the fire of men who cannot control their own fire.

Apropos of the full sight I believe that our ancestors at Bennington, King's Mountain and New Orleans invariably used a fine sight. It is to be regretted that they never had the opportunity of learning from recent authority that this kind of sight is only suitable for target practice. I never knew any one to use a full sight under any circumstances and I never expect to. I think that Lieut. Batchelor can safely leave to the soldier the choice of his sight as Captain Blunt has done.

Lieut. Batchelor tells us (p. 14 Inf. Fire) that "there is no doubt of the great value of individual training" and then, almost in the same breath, that "very few men are individually good shots when under fire, and these few have their skill nullified in the field by the excitement of battle and by ignorance of the range."

These two statements produced a good deal of bewilderment in my mind, though no doubt it is all clear to Lieut. Batchelor.

That men are so frightened in battle as to be unable to avail themselves of their skill with their weapons I do not believe, and history does not show it. Panics have occurred and may occur again—but they are not so likely to occur among men who feel that they have in their hands trusty friends who will defend them in danger, as among men who are afraid of their own weapons. I know personally marksmen of an excitable temperament who never shoot so well as when under the influence of intense excitement. I believe that excitement and a sense of danger will in most cases counteract rather than add to the effects of hunger and fatigue.

We all remember Du Chaillu's description of his feelings when the gorilla was advancing upon him: "Du Chaillu, if you do not kill that gorilla he will certainly kill you." Under such circumstances a man will shoot with deadly certainty; *if he knows how*.

It is easier and more pleasant to criticise and scoff at existing systems than to carry them out faithfully. This fact leads to frequent changes—which are not always for the better.

"Fire Discipline" as presented to us in the valuable work of Lieut. Batchelor is a subject which may be understood in a few hours study; to acquire and retain a mastery of the art of marksmanship requires a lifetime of practice,—though to the professional soldier, it is an end worthy of his best efforts.

"Fire Discipline" is dependent upon "Individual Instruction" as its basis and necessary adjunct and there should be no rivalry between them.



## VI.

## "Whistler's Graphic Tables of Fire.—Jump."

Lieut. Geo. M. Wright, 1st Art'y, Ohio N. G.

THE article by Captain Chester in the January number of the JOURNAL, commenting on "Whistler's Graphic Tables of Fire," puts forth certain views of the author which seem so strange that I cannot resist the temptation of calling attention to them. The Captain does not believe that recoil begins in the breech-loading rifled gun, when fired, until the projectile leaves the piece,—“until the gun and the projectile become two separate and distinct bodies.” Let us quote more fully from him:—

“Major McKinley says that the pressure generated in the bore of the gun has a backward action. Does he mean to infer that it has not also a forward action? It will not be claimed that motion can take place in any direction until the inertia of the shot is overcome,—assuming, as we desire to do for the present, that there was no outflow of gas by the vent. But, many assert, when the projectile moves recoil begins. This we have the temerity to deny. We are not unmindful of Newton's Third Law. We claim, however, that it comes into operation, only when the gun and the projectile become two separate and distinct bodies. This they are not, in any physical sense, until the projectile leaves the bore,—we are considering breech-loading rifles only. While the projectile is traversing the bore, it is part of the envelope which encloses the gases. We do not claim that it is welded to the walls of the gun, but it is in such close contact therewith that gases under the enormous tension of perhaps 30,000 pounds to the square inch are unable to penetrate the joint. The gun and the projectile are practically one body. They constitute the envelope in which the gases are enclosed under very high, and, for a time, constantly increasing tension. By and by the envelope yields on its weakest side; but there is no rupture. No gas escapes; pressure is equal in all directions, and motion of the envelope as a whole is absolutely impossible. It is the case of the soap-bubble exactly, only there is no yielding save on one side. (We assume of course that there is no vent.) But the envelope is ruptured when the shot leaves the muzzle and Newton's Third Law then comes into operation. Action and reaction are then equal and opposite and recoil begins. Therefore we say that recoil has nothing to do with Jump in breech-loading rifled guns.”

Now let us examine this question. We have five things:—the gun, with its carriage, the powder, the projectile, the earth, and the atmosphere. The projectile and the powder lie within the gun, at the bottom of the bore (or in the chamber), the powder and more or less air filling the space between the projectile and the breech. The force is applied by the sudden conversion of the powder into gases, within the chamber and bore, *having enormous tension and exerting pressure in all directions*. The Captain's ballistic “bubble” begins to swell very suddenly. Why is its expansion nearly all in one direction? On the one side is the huge mass of the gun and its carriage, held by gravity to the earth; on the other side is the greatly inferior mass of the projectile in contact with the smooth surfaces of the grooves and lands of the bore, with only a column and mass of air in front to aid it in resisting the force applied. The Captain admits, as surely every one must do, that the gas tension is *enormous*, and, to use his language, “pressure is equal in all directions.” But he says that “motion of the envelope as a whole is absolutely impossible” until it “is ruptured when the shot leaves the muzzle and Newton's Third Law then comes into operation”; and then recoil begins. Therefore, he says:—“Recoil has nothing to do with Jump in breech-loading rifled guns.” Is it true that motion of the envelope of his ballistic “bubble” as a whole is impossible?

The Captain only mentions, as of slight consequence, the atmosphere in front of the projectile, and he wholly fails to consider as an element in the problem, the real character of the phenomenon resulting from the almost instantaneous evolution of a large volume of gases at an enormously high tension, confined in the chamber between the breech of the gun and the projectile. It is not like the soap-bubble, a case of a gently accelerated application of force, but it is *like the very sudden striking of a tremendous blow*. The direction of least resistance is at the end of the chamber filled by the projectile, and this end of the chamber gives way very suddenly. But there is something besides the projectile and its resistance (including friction in the bore) to be considered. These alone, in view of the suddenness and extreme violence of the blow, offer very great resistance; but in addition we have the elastic resistance of the atmosphere which is very suddenly compressed in front of the projectile. While very little or no gas may escape before the projectile leaves the muzzle, a rupture, indeed an extremely sudden and violent rupture, of "the envelope" of the Captain's ballistic "bubble" *does* take place, to all intents and purposes, the instant the projectile springs forward in the bore. The reaction is simultaneous, and a blow of equal force is struck at the same time in the opposite direction against the breech. It cannot be possible that the operation of the Third Law of Motion becomes suspended until "the gun and projectile become two separate and distinct bodies" in the sense of having no physical contact with each other. Action and reaction *must* be equal and opposite from the very inception of motion in the projectile. If the force were a gentle one and slowly applied (as in the case of the soap-bubble), the huge mass of the gun and its carriage would render the rearward action imperceptible, although the momentum in the one direction would be exactly equal to the momentum in the opposite direction; but in the case of the Captain's ballistic "bubble" the force is a very great one, and its application is like the very sudden striking of a tremendous blow; and it is a question of mass and construction as to whether or not the equilibrium of the gun and its carriage will be disturbed, and if so, how much.

Now, in regard to the movements of the gun called "Recoil" and "Jump." What do we know of these from actual experience? Do we not know to a certainty that they affect the flight of the projectile, and change the direction it would otherwise take? *If such movements of the gun do not take place until "the gun and projectile become two separate and distinct bodies," how can they possibly affect the flight of the projectile?* All such movements affecting the flight of the projectile *must* take place before the projectile has become entirely separated from the gun.

In regard to "Jump," while it may not be strictly accurate to speak of it as a component of "recoil," what other explanation is there more reasonable than that which connects it with, or rather, makes it a part of, the complex movement comprehended in that term? Try a simple experiment. Take any breech-loading rifle (one with a long barrel will be best for the purpose), using 45-70 or 45-90, or any heavy cartridge producing much recoil, and fire it at a target while the rifle barrel is held firmly against the side of a tree so that the part of the rifle barrel in contact with the tree is about midway its length. Compare shots so made with others fired with the left hand placed against the tree and the rifle barrel supported on the hand or wrist, but not in contact with the tree. After one has made a few close shots at game with such a rifle from a firm side-rest against a tree, he will have learned a lesson to be remembered. The shots fired from the solid side-rest will fly to the side away from the tree. If the same rifle be now taken and fired at a target, the rifle barrel being placed across and upon a solid rest about midway the length of the barrel, the shots will be found to fly high, compared with others fired from the same place but with the rifle resting on the closed fingers of the left hand and the left elbow resting on the solid rest. Now

take the same rifle and fire at the same target from a solid rest beneath the forward part of the barrel as near the muzzle as may be, without getting it so near as to affect the direction of outflow of the column of air in the barrel ahead of the bullet nor of the gases immediately behind it. The overshooting will very nearly disappear, and the result will approximate very closely to that from "off-hand" shooting with the same rifle.

These are facts which I have demonstrated by many experiments and with different rifles; but the heavier the cartridge and consequent recoil the more will this "Jump" be apparent. I am aware that Captain Chester will call each of these rifles a case of "two guns, one within the other"; but I am comparing different results with the same rifle, and the two-gun theory cannot affect the question,—even if it could materially affect the problem of "Jump" in any event. I will not take time now to controvert the Captain's argument on this point, except to say that in any breech-loading rifle the metallic cartridge case *must* become practically a part of the breech-block and part of the rifle almost instantly after the ignition of the powder, since the very much heavier bullet will not be started until lesser resistance in other directions is overcome. Hence the cartridge case must be considered as practically the chamber and a part of the breech immediately after ignition begins.

It would be well also in this connection to mention the movement of the rifle known among riflemen as "Buckling," which affects the flight of the projectile in the case of many small arms. This movement causes the bullet to fly low. It is usually accounted for by the springing together of the rifle, when fired, the recoil causing it to bend or bow upward near the breech, thus slightly elevating the breech with reference to the muzzle, causing, of course, low shooting. The amount of this movement depends upon the rifle and the manner in which it is held. Other things being equal, it is greatest in the case of a long, slim barrel attached to a stock weak in the grip and having considerable "drop," and using heavy charges of powder and lead. It is very slight in a rifle having a short, heavy barrel, attached to quite a straight stock, heavy and strong in the grip.

Now all these movements of the piece affect the direction of flight in the projectile, and consequently must take place before the projectile becomes entirely separated from the piece. In the case of small arms, we try to control, modify, or eliminate such movements by the construction of the rifle, or the manner in which it is held,—the *rifleman and any form of rest used being its "carriage."* In the case of cannon, such movements as take place in firing, affecting the flight of the projectile, are of very decided interest; and their study is important as bearing directly upon the most practical questions of construction and methods of mounting.

In the case of cannon, we have a force of practically the same nature and operating primarily in the same directions, as in the case of small arms; and we may have "jump" or "buckling," or a tendency to both, but the one predominating over the other, as a function of "the form, construction and general condition of the carriage" (as Lieutenant Whistler has said in regard to jump alone); and I will add, as a function also of the length, shape and construction of the gun itself and of its style of mounting on the carriage. But it would seem from Lieutenant Whistler's investigations, that in the case of the 8" M. L. rifled gun, the amount of "jump" increases with each increase in elevation up to a certain point, and diminishes with further elevation; and to many the statement of this observed fact seems almost paradoxical. A careful perusal of Lieutenant Whistler's very interesting and instructive article on "Practical Artillery," in the last number of the *Artillery Journal*, must convince any one that the elements entering into the problem of accurate artillery fire are by no means few, simple, or constant. That changes in the "jump" of the 8" M. L. rifled gun occur with

changes in elevation only proves that changes in elevation have caused a shifting of certain lines of resistance to the forces of recoil, or have caused changes in the relations and relative strength of the forces of such resistance.

Now in the case of "jump," Lieutenant Whistler says, as I understand Captain Chester, that the gun does not turn in the trunnion beds. (I have not seen Artillery Circular C, and have not myself had an opportunity to examine Lieutenant Whistler's "Graphic Tables of Fire.") While there may be no perceptible turning of the gun in the trunnion beds, may there not be a very slight movement at these points, quite imperceptible to our senses or upon any known instrument that can be used to detect it, but which would, in connection with other simultaneous movements or vibrations throughout the carriage itself, produce as a resultant a slight "jump" upward, or dipping downward, of the muzzle? In the article by Lieutenant Whistler, in the last *Artillery Journal*, above referred to, he says (p. 26):—"Examine carefully the elevating gear, it is almost impossible to put the arc on to the gun so that it will work absolutely true. The result is that the teeth become worn in certain places, the gear jams, and will undoubtedly affect the jump of the gun." Do not these facts point to the correctness of the conclusion above suggested?

As guns are now made and mounted, either a "jump" upward or a dipping downward of the muzzle, may be expected; but the forces tending to produce these being practically simultaneous, and opposite in the direction in which they act at the muzzle, the resultant would, of course, be a movement in but one direction,—or neither a "jump" nor dipping at all. In cases like that of the 8" M. L. rifled gun, where an increase in elevation beyond a certain point causes a change and decrease in the amount of jump, have we not good reason to suspect that the elevation has caused such a change in the lines or forces of resistance as to cause the force tending to produce a dipping at the muzzle to be relatively stronger than at lower elevations of the piece, although at the same time the resultant of the opposite simultaneous forces at the muzzle is still manifest in an upward "jump," but of less extent than at lower elevations? Is it necessary to assume that a decrease in amount of jump is the result of a secondary downward reaction taking place during the infinitely brief time required for the projectile to traverse the length of the bore?

These are mere thoughts or suggestions which, as Captain Chester would say, I cast "into the caldron" for what they are worth; and I trust that what I have written will not be misunderstood nor misconstrued. I certainly entertain the very greatest respect for one speaking with the high authority of Captain Chester upon such a subject. But he has invited, indeed urged, a full and perfectly free discussion, and I think the importance of the subject demands it. As before stated, all these movements of the gun affecting the flight of its projectile present problems in construction and styles of mounting of very practical importance.

## Reprints and Translations.\*

### NOTES OF LECTURES ON ARTILLERY IN COAST DEFENSE.

*(Proceedings of the Royal Artillery Institution.)*

BY MAJOR A. C. HANSARD, R. A., INSTRUCTOR OF GUNNERY.

*(By permission.)*

Continued from No. 62, page 379.

#### PART III.—FIRE CONTROL.

UNDER the head of "Fire Tactics" we considered the questions what object to fire at, and what projectiles to use. We now have to consider the means by which we can ensure that those projectiles shall hit the object.

A foreign writer has said that the object of a good system of "Fire Control" (or control of the trajectory) should be to enable the commander to hold, as it were, the mean trajectory of his guns in his hand, and direct a stream of projectiles on to any spot he may wish, with the same facility with which a gardener, holding a hose, can direct a stream of water-drops on to first one plant and then another.

There are three methods in use, by which this object is attained more or less completely; the method used depending on the availability of instruments to find the range, or position of the object; or the absence of any such aids.

We will take the last case first, namely, that in which we have no instrumental means of finding the range. The best way to make the method clear is, perhaps, to take an example. We will therefore suppose that an object is approaching us, and is now at a range estimated to be 2000 yards. We first of all fire a shot, at an elevation short of 2000 yards, to make sure that the distance of the object has not been overestimated; for this first shot an elevation should be selected, so much shorter than that at which the object is believed to be, as will allow plenty of time to load and lay the remainder of the guns. We may suppose that the object is advancing at a rate of about four miles an hour; at this rate it will take about a minute and-a-half to cover 200 yards; we, therefore, fix on 1800 yards as the elevation at which to fire our first shot. The burst of the shell (or with heavy guns, the splash of the projectile) will show us whether this shot fell beyond the object, or between us and the object; and if the latter, we can judge

\* Please address communications concerning reprints, translations and reviews to Lieut. J. C. Busu, editor of this department.

whether it was well short or close up. We cannot estimate the amount by which it was short, or at least any such estimate is likely to be very misleading, but we can almost always tell that it was certainly a good deal short or not very much short. If not short or close up, we should have to take off another 200 yards elevation and try again; but if well short, the greater part of the guns, which have been told off as "salvo guns," are loaded and laid at an elevation somewhat shorter than that of the first shot, in this case at 1750 yards, the fuse (for time shrapnel) being bored accordingly. The whole of the guns are kept laid on the object, the "ranging guns" with an elevation of 1800 yards, and the "salvo guns" with 1750 yards; and at intervals a shot is fired from one of the ranging guns. As long as these shots are observed to fall short, we know that the object has not yet arrived at the 1800 yard range; but as soon as one is observed to hit, or to fall over, we know that it has arrived at or passed that range, and, making a short pause, a salvo is fired from the salvo guns; the ranging guns are again loaded and laid at 1600 yards elevation, and the salvo guns at 1550 yards, and the process repeated. If the object had been retiring instead of advancing, the process would have been reversed; the first shot would then have been fired at a range greater than the estimated range, and if that fell well over, the salvo guns would be laid with an elevation 50 yards more than that of the ranging guns. Now what was done in the above example was, that a range of 1750 yards was predicted as the range at which to fire the salvo guns; and by using a portion of the guns (in practice usually two guns are told off for this purpose) as a range-finder, we were able to tell when the object had advanced to within 50 yards of the predicted range. The difference of 50 yards is to allow for time to observe the result of the last ranging shot, to communicate to the salvo guns the order to fire, and for the time of flight of the projectiles. If the speed of the object is increased, a larger difference must be made between the elevations of the ranging and salvo guns; and also a larger difference between two successive predicted ranges.

Where several groups are being fought together under this system, the leeward group would usually be told off as the ranging group, the remaining groups as salvo groups, and the fire control would be in the hands of a sub-commander; where one group is acting alone the group officer would have to control the fire, and would tell off his two leeward guns as range-finding guns.

This system would usually be employed with guns of the movable armament, or those of the secondary armament not supplied with the depression range-finders, but even guns of the primary armament must be fought by this method, if their position or range-finding instruments are for any reason unavailable.

The ammunition to be used depends on considerations already treated of under "Fire Tactics"; if boats are to be attacked, time shrapnel will be used with the salvo guns, and percussion shrapnel or common from the ranging guns, according to the size of the guns; from small guns common is the best to use on account of its larger bursting charge, but with medium and heavy guns shrapnel would be preferable on account of the bursting



charge being large enough to give a visible burst and the advantage of using the same projectile throughout; or segment from R. B. L. With heavy guns when time shrapnel is not to be used from the salvo guns, both they and the ranging guns would use the same projectiles.

When ranging with percussion shell, the object should be to get the shell to burst to windward of the target, so that the drifting smoke may give a clear indication of the result of the shot; sufficient deflection must, therefore, be given to carry the shot to windward, unless the target has a broad front, when it would be sufficient to lay on the windward flank, without more deflection than is necessary to counteract the wind and bring the shot on to the point aimed at. The salvo guns will, of course, only have this latter deflection if the object is advancing or retiring direct. If the object is making a diagonal course, with regard to the line of fire, deflection will also be necessary to compensate for the transverse movement during the time of flight; which may be taken as five seconds with R. M. L. guns at medium ranges. A rough rule, to find the number of minutes deflection necessary, when no instrument is available by which the angle moved through by the target in a given time can be measured, is to multiply the (supposed) rate of the object, in miles per hour, by five. In the case of a diagonal course, the distance between successive predicted ranges may be decreased, as also the difference between the elevations of the ranging and salvo guns. An object in motion cannot remain at a constant range unless it moves on the arc of a circle, in such an unlikely case the range could be found as for a standing target.

The system of fire control without a range-finder when the object is stationary is briefly as follows:—In this case all the guns of a group are used to find the range. The first shot, from the leeward gun, is fired at the estimated range of the object, the second with so much added to or subtracted from it as will ensure its falling on the opposite side of the object; if successful in this, the object is now included between two known ranges; this is called obtaining the "long bracket"; the next shot is fired at the mean of this bracket, and the next at the mean of the last elevation that gave a + and the last that gave a —; this process is repeated until the object has been included between two elevations (ranges) which only differ by 50 yards; called the "short bracket"; a "verifying series," of usually four shots, is then fired at the mean elevation of the short bracket; if the result is that half of the verifying shots go over and half under, the mean trajectory passes approximately through the water-line of the object; if that object is a low one, such as a boat, we should accept this as the correct range; if the object is a high one, such as the side of a ship, we must raise the mean trajectory by adding on 25 yards elevation; anything over five feet should be looked upon as a high target. If three-fourths of the verifying series are overs, the mean trajectory passes above the water-line, and we should keep to that range with a high target, but reduce by 25 yards for a low one: if three-fourths are unders, the mean trajectory is short of the object, and the range must be increased. If the first three shots at a low target, or the first two at a high one, are under, the proportion is already wrong and the verifying series should be continued at the increased range;



if the first three are over, at a low target, the proportion is already wrong, and the series should be continued at the reduced range. Deflection in addition to that required to counteract wind, must be given for the ranging shots, to carry the shot to the windward of the object and facilitate observation, unless the object has considerable breadth; this additional deflection should be taken off when the verifying series is arrived at.

When time shrapnel is to be employed, the fuses will have to be verified after the range is found; the mean height of burst of two fuses, bored to the same length, being taken as the datum from which to correct the length. The rule for height of burst is that the apparent height in feet above the point aimed at must not exceed the number of hundreds of yards in the range; this is for R.M.L. or R.B.L. guns; for B.L. guns the number of feet must not exceed two-thirds of the number of hundreds of yards.

In all ranging it is most important that all the guns should invariably be laid on the same spot; in coast gunnery this spot is defined to be the water-line at the stem of the ship; or when the ship is in such a course that the stem is not visible, on the water-line at the stern; if it is wished to shift the trajectory to any other part of the object, this must be done by corrections on the scales and not by laying on a different part of the object. When time shrapnel is used at the decks of ships at anchor, the elevation must be corrected to shift the trajectory on to the deck, and the height of burst judged from the level of the deck.

The following notes as to ranging at a standing object may be found useful. First, it is better to get the first shot short rather than over, as giving a more easily observed result; especially on service, where the object would be, probably, obscured at intervals by its own smoke; but as our endeavor should always be to hit the enemy if possible, the first shot must not be fired at a range which is *known* to be less than that of the object.

Secondly, do not be afraid of a bold alteration in elevation for the second shot: 10 per cent. of the range would be the usual correction, but if the range is quite unknown and a long one, 20 per cent. would not be too much; "creeping" up to the target by small alterations is very slow, and wasteful of ammunition; and, further, it is much more likely to have a disturbing effect on the accuracy of the enemy's fire, if he finds shots falling on both sides of him.

Thirdly, no notice should be taken of the result of a round which was unsteady in flight, or the result of which was not properly observed, or appeared doubtful; always repeat a shot at the same elevation in such cases.

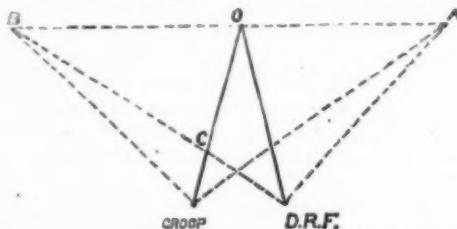
Fourthly, if a hit is obtained before the verifying series is reached, at once commence such a series at the elevation which gave the hit.

Fifthly, having obtained the correct trajectory with percussion shell, do not alter the elevation when firing time shrapnel; should anything seem to indicate that a change of elevation is required, return to percussion shell and verify afresh. An exception to this rule is when, in verifying the length of fuse, two or more shells are blind or burst on graze, and all on the same side of the object; these shots may then be considered as if they formed part of the verifying series, and the elevation altered accordingly.

The possibility of obtaining good effect with this system of fire control depends on correct observation of the result of each round, as, indeed, is the case with any system; the most difficult case occurs when the object is stationary and the smoke drifts straight from the enemy towards the guns, or *vice versa*; laying would then have to be done either by auxiliary marks, or by using clinometer for elevation and marking the racer for direction (if the guns are not fitted with index plates and graduated arcs); and the observation could be assisted, where practicable, by flanking parties, or the ranging may be conducted by salvos instead of by single shots.

The second system of fire control is that used when an instrument is available which can give the ranges continuously of a moving object on the water; such an instrument is the depression range-finder.

This instrument works with a vertical base and, therefore, requires to be at a certain height above the water; it would usually be placed on a flank of the battery, sufficiently far away for the levelling not to be affected by the shock of discharge. Where the site is suitable it is placed behind and above the guns. When flank positions only are available, two stations should be provided, one on each flank, and that one occupied which is to windward, and is, therefore, not interfered with by smoke. In any case the instrument will be at some distance from the guns, and consequently the range as given by the instrument will not be the true range from the guns in all cases. The distance from the centre of a group of guns to the range-finder is called the "displacement" of that group; the difference between the range from the group to an object, and the range from the depression range-finder to the same object, is called the "group difference." This difference is a variable quantity; at *O* on diagram the range is the same from the group and from the range-finder and the group difference would be



zero; as the object moves from *O* to *A*, the difference is constantly increasing and is a + quantity; as it moves from *O* to *B* it is also constantly increasing, and is a - quantity. Thus the differences vary with the different angles of training of the guns. The difference also varies with the range. When the object moves towards the group from *O* to *C*, the training has, of course, not altered; but the difference which at *O* was zero, has become a large minus quantity. For this reason, in order that the tables may remain correct approximately for all ranges, the depression range-finder must not be placed more than about 200 yards to a flank of the groups. These differences are either calculated (which gives the best results), or obtained by construction (in the manner shown in regulations for garrison

artillery practice); and tabulated; the calculation being made for a medium range of, usually, 2000 yards.

Group difference tables are only made out in multiples of 25 yards; as are all other tables of range corrections; the length of the probable rectangle being such that it is not worth while considering any less quantity. The tables show the corrections which have to be made between certain angles of training. There must be in each group a group difference table for each station of the depression range-finder.

The method of using the table is as follows:—The group officer, who in this system chooses the actual moment to fire his guns (subject to the orders he may have received from the fire commander as to rate and order of firing), watches the dial by which the ranges are passed down to him; and, taking into account the rate at which the range is altering, and the time that it takes to lay the guns, makes up his mind to commence firing when the dial shows a certain range. He then looks at the training of a gun, first ascertaining that it is nearly on the object, notes the reading on the arc, and referring to his difference table finds against that reading a certain correction; he makes this correction to the range he made up his mind to fire at, and gives the order to lay with this corrected range; he then watches the dial again, and when it shows the range at which he decided to fire, he gives the order, "Commence firing." An example, perhaps, makes this process clearer.

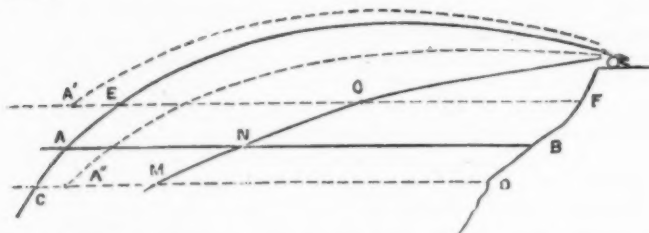
During the loading the group officer has ascertained that the range, as shown on the dial, is decreasing by 100 yards every 15 seconds; when the guns are run up the range dial reads 2500 yards; he knows that it will take 30 seconds to lay the guns, and therefore decides to fire when the dial reads 2300. As soon as one of the guns is nearly on the object (for direction) he notes that the training reads  $330^\circ$ , referring to his table he finds that between the trainings  $315^\circ$  and  $340^\circ$ , a correction of  $+75$  is necessary (this means, of course, that in that position the object is approximately 75 yards farther from the group than the depression range-finder); he then gives the order, "2375 yards, lay," and as soon as the dial shows 2300 he gives the order, "Commence firing." In practice it will be found to save trouble if the different corrections are chalked on the floor against the portion of the arc to which they refer, as the group officer is then saved the necessity of referring to the table.

By this means the range from the depression range-finding station to the object is converted, at each group, into the range from that group by the group officers.

There are, however, several other corrections which have to be made by the fire commander; for the elevation which must be given to a gun in order to hit an object (which is called the relative range), is a very different thing from the actual range, or distance from the gun to that object.

The first point to be considered by the fire commander is whether his guns are laid by tangent sights for elevation, in the drill-book called case I.; or by index plates, or some other means of giving quadrant elevation, in the drill-book case II. If the latter is used he will have to make a correction to

the range due to the state of the tide. The reason for this is shown by the diagram.



The quadrant elevation is calculated for mean tide level, or rather for seven feet above that level (seven feet being about half the height of side of a battle-ship). Now, if the gun is elevated to a certain range on the index plate, successive shots similarly laid will follow the same trajectory (*EAC* in diagram) cutting the mean tide level *AB* in *A*; if the tide rises to the level *EF*, the trajectory cuts it at *E*; and in order to reach an object at the same distance from the gun as before, as *A'*, more elevation must be given. If the tide falls to *CD*, the trajectory cuts the water-line at a greater distance from the gun, and elevation must be taken off. The error due to tide also varies with the range; at long ranges, where the trajectory is very curved, the errors are small; but at short ranges, where the trajectory is flat, as at *MNO*, the errors are large. Also the errors will not be the same when using R. M. L. guns with low velocities and consequently curved trajectories, as with B. L. guns having high velocities and, therefore, flat trajectories, especially at short ranges. In practice it is found sufficient if a table is made showing the correction necessary at each 1000 yards in range, and for each quarter-tide, the corrections being given in multiples of 25 yards. This correction is not necessary when laying the guns for elevation by tangent scale, as the elevation is then given with reference to the line of sight and not from a horizontal plane.

The next error to be considered is that due to the fact that different brands of powder do not give a constant muzzle velocity to the projectile; and that atmospheric influences, such as increase or decrease of density, due to the presence of more or less moisture, increase or decrease of temperature, barometric pressure, or of wind blowing up or down the range, give variations in the amount of resistance to the passage of the projectile through the air. The effect of these different influences is known as the "powder error," or the "error of the day." This error is beyond calculation, and can only be ascertained by observation of the results of the first shots; or, if time permits, a few trial shots may be fired at a known range. It should be pointed out, however, that the greater part of this error is due to a deficiency in muzzle velocity, arising from the age or difference of brand of the powder; and that, therefore, the error will not be constant at all ranges. The table at page 310 "Text-book of Gunnery," illustrates this well. It is there shown that with a 12-inch B. L. gun (muzzle velocity 1900) a loss in muzzle velocity of 50 f. s. would result in a loss in range of 50 yards at 1000 yards, and of 175

yards at 4000 yards. Hence a trial shot from this gun, fired at a known range of 1000 yards, and falling 50 yards short, would in reality indicate that a correction of 175 yards was required at 4000 yards. Again, the same table shows that half a gale of wind blowing up the range (towards the gun) would cause an error of one and-a-half yards (practically imperceptible) at 1000 yards, but at 4000 yards the error would be 32 yards. Thus it is evident that reliable information, as to the error of the day, can only be obtained by trial shots fired at a known range, if this range is somewhere about the same as that at which we are about to engage the enemy. It would usually be safe to give a  $\pm$  correction for the first shot, as powder rarely "shoots up to the tangent scale."

When firing at a ship, a further correction must be made to carry the trajectory on to that part of the ship we wish to hit. This is necessary because, as mentioned before, guns are laid on the stem at the water-line (or stern at the water-line when the stem is not visible), and ranges are taken to the same points. If, therefore, no correction is made for length, a correctly laid salvo will all hit about the stem or stern, and some of the shots will certainly fall short and do no damage. We may wish to hit a definite point, as for instance, the forward bulk-head in a central citadel ship end-on at a short range, and in that case would find, in the list of ships, the distance of this point from the point aimed at; but if the length of range precluded any idea of attacking a particular point, we should add on about half the length of the ship, say 50 yards for battle-ships, so as to bring the trajectory on to the centre; if the ship makes a diagonal course with the line of fire, a less correction will be required. This correction will generally be an addition to the elevation, as we are generally laying at the nearest part of the ship, and trying to hit the point further off.\* When the ship is broadside-on, or nearly so, no correction to range is ordinarily necessary if using quadrant elevation; but with tangent elevation usually a sufficient addition must be made to raise the point of impact a few feet, viz.: from the water-line which is the point aimed at, to half-way up the side. An exception would be in the attack of a water-line belt at close ranges, where with quadrant elevation some elevation may have to be taken off.

So far the corrections that have been mentioned are equally applicable to either a standing or moving object. When the object is in motion, there is yet another correction to be made; this is due to the travel of the object, during the time which elapses between the moment when the drum-reader calls out the range, and the fall of the shot on the water. This time is made up of: first, the time lost in passing the range from the instrument to the group dial; second, the time lost between the group officer's command to "commence firing" and the firing of the gun; and lastly, of the time of flight. The first two times, which are included in the term "time of firing," will vary according to the facility with which the range can be passed to the groups, and also according as the guns are laid by tangent or quadrant elevation; but for a given method of laying in any work, they can be made,

\*When the ship is retiring from the battery in a course which makes an angle of about  $45^\circ$ , or less, with the line of fire, her bows will be visible from the guns, and if that point is laid on, some elevation must be taken off in order that the centre of the vessel may be struck.

by good drill and practice, very nearly constant; and having once been ascertained, this "time of firing" must be always adhered to. The time of flight, of course, varies according to the range.

The actual distance travelled by the object during the time in question is not important, what we want to know is, by how much the range is increased or diminished during that time.

This can be ascertained by watching the dial, and taking the number of seconds which elapse while the range changes by 50 yards. Suppose, for instance, that it is observed that the range is altering 50 yards every eight seconds, and that the time of firing is three seconds, and the time of flight for the range is five seconds; then a correction has to be made for the alteration of the range during eight seconds, and as this alters 50 yards in that time, 50 yards will be the correction to be made. If the range altered 50 yards in four seconds, a correction of 100 yards would have to be made; and if it altered 50 yards in sixteen seconds, a correction of 25 yards would have to be made. The correction must be added if the range is increasing, subtracted if decreasing. Tables are made out to show the corrections at various ranges. Separate tables are required for case I. and for case II.; the "time of firing" being different in each case.

The explanation of these various corrections to the range takes some time, and it may, therefore, appear as if much calculation was involved; but, as a matter of fact, with a little practice the application of them is easy.

Before an action commences the fire commander will know by what means his guns have to be laid, and consequently whether the correction for tide will be necessary or no. If so, he will have also ascertained the state of the tide; then, as soon as his object is indicated to him by the section commander, and its range approximately obtained, he can by reference to the table see the necessary correction. He will make a correction for powder, either as the result of observation of previous rounds or for the first shot by an estimate. He will also make a correction for the length of the vessel, which need be only approximate. Lastly, he will observe the rate at which the dial is changing, and make a correction for "time of firing." It is convenient to have a note-book ruled in columns as follows:—

	+	-	+	-	+	-
Powder ... ..	50					
Tide ... ..		25				
Length ... ..	50					
Time of firing..		25				
Net Total	+ 50					

The net result of the several corrections he will give to the dial number, who will show the range, as read by drum-reader, corrected by this amount.

For instance, suppose the guns (9-inch R.M.L.) to be laid by quadrant



elevation; the tide to be low; range 3000 yards; object, a battle-ship, approaching nearly end-on; and powder has been shooting 50 yards short at this range.

Then, the fire commander sees by his table that for low tide at 3000 yards — 25 is the correction required, and enters it in the — column; for powder he enters 50 in the + column, and the same amount for length of ship; he now ascertains that the range is decreasing 50 yards in 20 seconds; looking to the "time of firing" table for case II., he sees that the correction is 25 yards, and, as the range is decreasing, this must be entered in the — column. The net result of these corrections is + 50, which he, therefore, gives to the dial number, who, until a fresh correction is given him, will always show on his dial 50 yards more range than is read out by the drum-reader.

The fire commander will also have to correct for deflection; for which three things have to be considered; first, if the wind is across the range, sufficient deflection must be given to counteract its effect; secondly, a correction must be made (except when the ship is end-on to the guns) to carry the trajectory from the point aimed at (*viz.*, the stem) to the point we wish to hit; these two corrections being necessary for stationary as well as moving objects. Lastly, correction must be made for the travel of the object during the time of flight. The actual distance travelled in this time is not of moment, the essential point to be ascertained is the arc traversed by the object. For instance, if a point moves through an arc of one degree in five seconds of time, and the time of flight is also five seconds, it is clear that we must lay the gun one degree ahead of that point in order to hit it; if the time of flight were 10 seconds, we should have to lay two degrees ahead; and if two-and-a-half seconds, half a degree ahead, and so on. When the guns are laid by quadrant elevation the time of flight is all that need be considered, as the gun-layer standing on the sighting-step keeps his gun laid for direction until the moment of firing; when tangent elevation is used a small time of firing, to allow for the layer to get down from the slide, must be added to the times of flight. Thus there must be two tables, one for case I. and one for case II., as with the range correction. The time taken by the object to pass over one degree, can be ascertained by watching the graduated arc of the depression range-finder.

These corrections can also be conveniently noted on a ruled form as:—

	L.	R.	L.	R.
Wind... ..	10			
Length... ..	60			
Time of flight		45		
Net total... ..	25 L			

To take an instance, suppose a battle-ship broadside-on (300 feet long) passes from L to R over one degree in ten seconds; range 3000 yards; wind



from left to right requiring 10 minutes to counteract it ; then 10 minutes L are required for wind ;  $\frac{150 \times 12}{30} = 60$  minutes L are required if we wish to hit her in the centre ; and from the table 45 minutes R to correct for time of flight ; or a net result of 25' Left. As the service dial can only signal in quarter-degrees this would be signalled as half a degree. It may be remarked that a very rough approximation would be sufficient in engaging so large an object as a battle-ship, unless we wished to attempt the destruction of a definite portion of her ; since if she is end-on only wind correction is required ; and if broadside-on, and in motion, the corrections for length and for time of flight will approximately cancel each other.

The corrections, both to range and to deflection, can only be looked upon as approximations ; the only way to get good shooting is to carefully observe the result of each shot, or salvo, and make corrections accordingly. Many circumstances which defy calculation, such as refraction, which causes the object to appear, and the guns to be laid (with tangent elevation) too high, and other atmospheric conditions, affect the shooting ; so that the first shots must always be regarded in the light of trial shots. If the corrections above treated of are properly made, the error cannot, however, be very great ; and in cases where, from the enemy's smoke or other causes, the observation is difficult, unless they are made there can be no chance of hitting the object ; in any case the nearer the first shot falls, the easier it will be to observe and correct the error.

The error in range can be measured by the depression range-finder, the range being taken to the splash of the shot, the difference between this and the range of the ship at the same moment being the correction to be applied for the next round. It has been suggested that this correction may be automatically made by bringing the cross-wire on the splash, and making the horizontal wire cut it by sliding the fulcrum in or out, without altering the range ; then, bringing the wires back on to the object by the drum, a new range will be found—which will be the corrected range. This would give good results at a stationary object, but if the tidal error or a large powder error enter into the question, it will not give true results ; the instrument, set thus with a false height, would give corrections varying directly with the range ; while the tidal error varies inversely as the range and the powder error bears a fractional proportion to the range.

The error in direction is best judged by eye, and if the fire commander's station is at some distance to a flank of the guns, he must have an observer near them to estimate this error for him, who, of course, must be in communication with him. The angular error in direction can, of course, be measured by the arc of the depression range-finder if the observer is sufficiently well trained. It is much to be wished that a second depression range-finder for the purposes of observation should be mounted in each fire commander's station ; this would obviate the necessity for taking the other instrument away from its proper function of continuously recording the range.

It facilitates the making of corrections if the tables are mounted on rollers ; there should be one roller for case II., having on it a tide table ; a

table of corrections to range for a time of firing of (usually) about three seconds; and a deflection table for the times of flight. A roller for case I. requires no tide table; a table of range corrections for time of firing (usually) about eight seconds; and a deflection table for times of flight plus two to four seconds for gun-layer to get clear of recoil. The tables should be so mounted on the roller that the corrections for a given range come one under the other.

In this system of fire control the fire commander is entirely responsible for the correctness of the trajectory; he has, therefore, to make the corrections and observe the results. It should be noted that the corrections will need constant watching; as the range changes, the tidal error may change, also the powder error; if the vessel alters her speed or changes her direction, the rate at which the range increases or decreases will vary, and so will the deflection correction.

The group officer's responsibility in this system, as regards fire control, is limited to choosing the proper moment to fire, and to making the proper correction for group difference; he has, of course, the responsibility of seeing that the guns are being correctly loaded and laid and at the right object, but this is part of the duties included under "Fire Discipline." The gun-captains are also responsible that the guns are not fired, unless the laying has been properly completed within the prescribed time of firing, even though they receive the order from the group officer to commence firing.

The third system of fire control is that used when we have an instrument which can tell us, not only the range to an object, but the position of the object with reference to the guns, that is the range and training necessary. The position-finder is such an instrument, and it automatically records, on dials at the group, the range and training to the object from the group by simply bringing the telescope of the instrument on to the object; thus the necessity for a group difference correction is done away with; but there must be a separate instrument for each group.

In this system the guns are laid, not on the object but on a spot over which it is about to pass, and fired when it comes over that spot. The process is shortly as follows: The operator at the instrument, who has been informed by the fire commander of the ship, and the portion of it, if any, which he wishes to attack, follows up the object until he receives a signal from the group that they are ready to lay. The instrument is provided with a pencil which, as the telescope is moved, traces on a slate the course followed by the object on which the telescope is directed. As soon then as he receives the signal he traces the course of the vessel for, say, a half-minute and then "predicts," by reference to this course, where the object will be at the end of another half-minute; certain corrections have to be made, as for drift (the gun being laid by training arc and not by tangent scale for direction); for travel during the time of flight (no time of firing enters into this case, as the guns are fired electrically from the position-finding station, at the moment when the object comes over the predicted position); for powder, length of ship, and tide; but these corrections are made, simply, by the application of scales. The point at which the gun

must be laid, in order to hit the ship in the selected part as she comes over the predicted position, having thus been found and marked on the slate, the pencil of the instrument is brought over this spot; a signal is then sent to the group that the training and range, then showing on the dials, are those at which the gun is to be laid. The pencil is then brought over the predicted position, and as the ship crosses the cross-wires of the telescope the operator fires the guns.

The observation of result, and correction of error of the shot is effected very easily by means of a flexible finger attached to the instrument; the cross-wires of the telescope being brought on to the splash, the flexible finger is brought over the point aimed at, thus automatically showing for the next shot the correction required; for if the pencil is brought over the next predicted position of the object the finger will show the point that must be aimed at.

This system gives the most perfect division of labor; the fire commander can devote his entire attention to the effect produced by his fire on the enemy; the operator makes all corrections to ensure the trajectory passing through the desired spot; and the group officer can devote his entire attention to the superintendence of the fire discipline of his group.

The group officer has control of the fire to the extent that his group cannot be fired without his orders, so ensuring that the guns are properly laid; also the prediction cannot be made until his order to lay is given; a switch which controls the firing current for the whole group, and worked by a dial number under the group officer's orders being placed in the group.

A firing plug, which makes another controllable break in the firing current, is placed in the circuit of each gun, under charge of the gun-captain, who does not insert it until he is satisfied that his gun is correctly laid at the predicted range and training, and no number is in danger from the recoil. Thus if any one gun of the group is not ready, and the group officer, in order not to lose the prediction, gives the order to commence firing, that particular gun will not be fired.

As regards the advantages and disadvantages of the three systems. With the first, there is the serious disadvantage that a proportion of our guns are occupied in firing at a spot on the water, to tell us when the enemy arrives at that spot; a large proportion of the projectiles from these ranging guns can, therefore, have no chance of inflicting damage, and the volume of effective fire is by so much reduced. Also since we can only tell by this method when the object reaches a range some 50 yards distant from the predicted range, a possible error is introduced. The system has one characteristic which may be set to its credit, namely, that no calculation is necessary, that by its means fire can be maintained at a moving object without the aid of any range-finding instrument, and that no trained specialists are required. It has a further disadvantage from the fire discipline point of view, that when the group officer is conducting the fire of a single group, he must of necessity give all his attention to observing his fire, and cannot properly superintend the fire discipline of his group.

In the second system, the necessity for corrections involves possible sources of error which, when observation of fire is difficult, may escape de-

tection. Also, the fire commander is likely to have his attention so much taken up by them, that he cannot properly devote himself to the observation of effect of his fire on the object, and to the consideration of the proper moment to change his projectiles.

In the first system the officer controlling the fire must be in or near the battery, and cannot well be in direct communication with his next superior; this is, of course, a disadvantage.

In the depression range-finder system the fire commander can be at some little distance from the guns, out of their smoke, and out of reach of shells directed at the battery; the possible positions, however, are limited in most cases; and a shift of wind may necessitate a change to a fresh fighting station. With the position-finder, as this instrument does not involve group difference correction, the best possible position can be found for it, irrespective of distance, the only condition necessary being that it should be at a certain height, and be able to cover the whole area covered by the guns it works; and the cells for several position-finders can be placed so as to be well under the control of the fire commander. Also several fire commanders stations can be placed within easy reach of the section commander's position, thus making the tactical control much easier.

Moreover, for guns mounted in casemates, where the accumulation of smoke would soon render laying over sights an impossibility; or for high-angle guns or howitzers mounted in concealed batteries, from which no direct view of the enemy is possible, this system is a necessity. The presence of smoke in front of a casemated work becomes, with this system, a positive advantage, as tending to prevent accurate laying on the part of the enemy, whilst not interfering with our own. The general introduction of smokeless powder will, however, greatly modify these advantages. With the depression range-finding system one instrument can give ranges for several groups, but can only fight one object at a time; with the position-finding system there must be one instrument to each group, thus necessitating a large increase of specially-trained men, and involving the throwing of a group out of action, should its particular instrument become from any cause unserviceable. Each group could, however, be directed at a different object or part of a vessel if required. With depression range-finding system there should always be a second instrument in reserve.

In the lecture on "Fire Tactics" it was pointed out that it is very desirable that we should have the power of obtaining simultaneous hits, as close together as possible; this is always of importance as regards the salvo from each group, and is also desirable as regards the fire of a work as a whole.

With any system of fire control in which the guns are laid for direction by sights, the possibility of concentrating the fire on a particular spot is obtained. This is not the case with the position-finding system, as the guns are then laid by the arcs, which are oriented alike, the lines of fire are, therefore, parallel. Suppose a ship, breadth 60 feet, is engaging end-on a group of four guns, fought by position finder, the distance from muzzle to muzzle being 24 feet, the lines of fire of the outermost guns will be 72 feet apart, and their projectiles will, therefore, miss the vessel. This is a serious

disadvantage at present to the position-finding system; it can, of course, be mitigated by subdivision of the groups, but this necessitates a large increase of specialists and instruments, multiplication of lines of communication, a larger number of group officers, and, most important of all, we then lose the power of firing large salvos simultaneously.

As regards simultaneous hits, the position-finding system ensures the guns of a group being fired absolutely at the same instant; with depression range-finding system we do not get this absolutely as the guns are fired by word of command; there is no reason, however, why the guns should not be fired electrically by the group officer, if the proper fittings were provided, so that this defect cannot be looked upon as inherent in the depression range-finding system. As regards the possibility of obtaining simultaneous hits from a number of groups, this is practicable with depression range-finder, the fire commander ordering the group officers to all lay for a given range; with position-finder it is not practicable, the fire commander having no possible means of pointing out a special spot for prediction to all the operators.

An examination of practice reports seem to show that there is not much difference in the effectiveness of fire conducted by the two systems; if any exists it is in favor of the depression range-finder. At practice, however, usually only one or two guns of a group are manned, if the whole were fired, probably the percentage of hits would be much more in favor of the depression range-finder than it is at present.

It may be noted that if absence of smoke permits laying for direction by sights, the position-finder can be used in the same way as the depression range-finder, and being an improved and larger instrument, correcting automatically for displacement, and requiring no calculations on the part of the fire commander, should give the highest possible results. The system of control in this case would be the same as with depression range-finder, the guns being fired by order of group officers and gun-captains.

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NOTE.—It has been proposed to arrange the training arcs so that the lines of fire should converge at 2000 yards; it should be borne in mind that the angle necessary to converge these lines varies not only with the range, but with the angle of training; therefore this plan would only converge the fire for one position of the enemy. A better plan would be that a dial for each gun should show the correct training for that gun. A difficulty arises in laying guns for direction by training arc, when there are no actual pivots, due to the play between the trucks and racers; the line of fire will vary slightly in direction, though the pointer reads the same, according as the last motion in training was trail right or trail left; the last motion should, therefore, be always in the same direction, in the same manner that the last motion of the elevating gear should always be one of depression.

## AN HISTORICAL SKETCH OF THE EVOLUTION OF TACTICS.

Translated from the German by

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**I**N this paper we will endeavor to present those salient features of the history of the art of war characteristic of the periods mentioned and which operated as important elements in further tactical development.

The military history of the Greeks and Romans in this connection calls for more than ordinary historical interest, for at a later time it served as a model on which to base an improvement of tactical methods.

### THE ART OF WAR OF THE ANCIENTS.

The Greeks preferably fought on foot; their mounted force was insignificant in numbers and exercised no decisive influence on the issue of battles. Their foot troops were formed in a single line of eight or more ranks, the phalanx. At the time of their Persian wars the front ranks were composed of men bearing armor and to this class only such citizens were eligible as possessed certain political privileges which enabled them to belong to that force as a matter of duty and right. The succeeding ranks were made up of the lower classes of freemen and of slaves; these latter opened the contest with their slings and javelins, hurling their missiles and weapons at the enemy over the heads or between the files of the armored men. Breaking into the enemy's force was the business of the front ranks, who armed with spears from  $7\frac{1}{2}$  to 9 feet long, executed their assaults in close order while in the *mêlée* they resorted to their short double-edged swords.

Up to the time of Epaminondas battles of the parallel order only were fought, in which the opposing forces approached each other and dissolved for individual combat without special leadership. A recognized art of troop-leading—the observance of tactical methods—is first noticed under Epaminondas. The oblique order of battle adopted by him consisted in this, that he strengthened one of his wings, not only in numerical force but in the excellence of his troops, and with this wing proceeded to the attack while he refused the other; still, owing to its proximity to the enemy, the refused wing was prevented from sending any assistance to that part of the line engaged. The armored men of the retired wing were placed at from 8 to 10 ranks deep, while the attacking wing, being formed of several bodies, consisted of an assaulting column 50 ranks in depth; the flanks of this column were protected by mounted troops and light infantry moving in echelon with the view to enveloping the enemy. The slaves had been replaced by special bodies of light foot troops. Sling-men, bow-men and spear-men, who at the time constituted a permanent force, gradually began to be substituted also for the citizens composing the armored troops.

Alexander the Great still further developed the tactical forms of the oblique order of battle—to the attacking wing he added his heavy cavalry which consisted of the Macedonian knighthood. During the subsequent



progress of his campaigns, when it became more a matter of occupying conquered territory than fighting decisive battles, cavalry became a still more important arm.

While the original Roman legion was probably very similar to the old Doric phalanx, during the Samnite wars it made a progress entirely its own. In the legion, the fighting body consisted of the Hastati and Principes formed in two lines; every 10 maniples had a strength of 120 men placed with intervals. Armed with a light and a heavy javelin, which latter they hurled on near approach, they immediately rushed forward, breaking the enemy's lines, when resort was had to the double-edged sword. As a reserve, available in case of emergency, a third line followed—10 maniples of 50 men composed of veterans, the Triarii; instead of the javelin the latter carried the spear of the Greek phalanx. Besides these three classes of troops, all of whom wore light armor, there was another body of light infantry, called the "Velites," who were armed with a number of light javelins and opened the fight as skirmishers.

Organization and armament were specially devised with reference to aggressive action. At first, only those were qualified to serve who possessed independent means; but after the Punic wars, when owing to Rome's policy of conquest it became necessary to maintain armies in distant countries for long periods of time, a system of enlistment was adopted in place of that in vogue; still the army continued to be a national one consisting, as it did, solely of citizens without property.

Many important changes were introduced with which Marius has been credited. Three maniples were united into a cohort with an average strength of 360 men. Instead of the four different classes of foot troops a medium heavy infantry was organized similar to the Principes and Hastati, though the light javelin was discarded. Generally 4 cohorts were drawn up in the first line and 3 in the second and third; then instead of a six rank formation, one of ten deep was used, so that where formerly under the maniple system but two legions could be placed, it was now possible to concentrate 5 in the same space—the handling of armies, which had become larger, was in this way rendered less difficult. It was with this organization and system that Cæsar won his victories over the Gauls.

Constant wars had established the permanence of the army which had become a standing one. Under the emperors it was also maintained in times of profound peace. For a while the legions preserved their national character but when this began to disappear during the reign of Trajan, through recruitment from other countries, the army was nearing its ruin.

#### THE MIDDLE AGES AND TO THE TIME OF THE THIRTY YEARS' WAR.

Soon after the division of the Roman empire, the Western half succumbed to the invasion of Germanic tribes concerning whose manner of conducting war but little that is reliable is known. These Germanic peoples established themselves in the conquered territory; the leaders or kings distributing the land among their followers, who in consequence thereof bound themselves to render military service in behalf of the former. From these landed proprietors the order of knighthood sprung, the members of which contin-



ued to render the service of vassals mounted and wearing armor. Each knight to be sure was accompanied by his loyal squires, still the honor to engage in single combat belonged to him alone. During the middle ages the observance of social distinction was even transferred to the battle-field. The contests of the time were therefore generally mounted affairs and while foot troops were never entirely absent, on the contrary were often in the majority, still their presence counted for naught, so far as bringing about a decision was concerned.

The foot troops, despised both socially and in a military sense, were restored to honor by the victories of the Swiss over Charles the Bold and the House of Austria, nor was this due to the effects of the newly invented fire-arm, but to the pike and the halberd with which these successes were gained.

The first small-arms were used during the middle of the 14th century, pieces of artillery soon after figured in sieges, though field guns were not introduced until towards the end of the 15th century, when a carriage had been constructed for them. As early as 1494 Charles VIII. of France took 36 cannon, drawn by horses, to Italy with him. The progress made in the improvement of small-arms was slower, though of a most steady character; not until 1528 did they displace the cross-bow,—more than 150 years after their first introduction. The fire-arm most extensively in use was the musket, weighing from 16 to 17 pounds, which in firing had to be supported on a fork.

At the beginning of the 16th century, musketeers composed but one-fourth of the armies; the pike continued to be the principal weapon for a long time thereafter; it did not disappear entirely until the year 1700 or 200 years later.

Following the example of the Swiss, other countries also organized bodies of foot troops as an adjunct to the cavalry composed of their chivalry.

The soldiers obtained from the German peasantry, and the Spanish infantry had become especially renowned and feared. The Swiss battle tactics were generally adopted.

The division of an army into three great masses, the organization commonly in vogue during the middle ages, was maintained. To each of these three principal bodies cavalry could be assigned; the foot troops, however, were formed into a solid square of equal sides—the number of men composing these depended upon the size of armies, though 10,000 men could be formed in this manner. In the front and flanks the heavily armored soldiers were placed as a sort of bulwark; these men received a double allowance of pay and carried spears nearly 16 feet long, so that the spears of those in the sixth rank reached beyond the front line.

Cavalry was powerless against these masses so long as they maintained their cohesion. The decision of battles rested on the impulse of these squares; musketeers opened the engagement by skirmishing along the front, but withdrew, however, under cover of the pike-men before the enemy's cavalry.

The important value hitherto placed upon the cavalry of armies in the

days of chivalry had been transferred to the foot troops and in consequence of this circumstance, the former was not only reduced in numbers but also in the quality of its composition; by the middle of the 16th century the ratio of cavalry to infantry was  $\frac{1}{4}$  to  $\frac{1}{6}$ . The knightly character of cavalry gradually disappeared and this arm soon after consisted of an enlisted force only.

Enlistments were voluntary and generally covered the period of a campaign; the soldier provided all his equipment and arms in return for which he received pay. The obligations entered into between the soldier and commanding officers, as well as between the latter and the ruler in whose interest the enlistment was made, were in the nature of a contract, both parties to the agreement binding themselves to a fulfilment of the conditions. When the ruler or prince lacked funds to pay his troops these refused him any further service, considered themselves justified in plundering without being held amenable therefor, and even threatened to go over to the enemy.

Military service was looked upon as a trade to be enjoyed by whom it pleased; the enlisted soldier took service without regard to nationality or country. Notwithstanding the little authority a ruler could exercise over an army raised in such a manner, it rendered him independent of his vassals who could frequently be induced to engage in his cause only after receiving concessions of great moment. The power of rulers prevailed in the end however and resulted in preventing an entire dissolution of States into separate units.

So long as the musketeers constituted the minority of forces there was no urgent necessity for changing the methods of fighting in existence up to that time. When, however, during the middle of the 16th century the contingents provided with fire-arms rapidly increased, in fact were often in the majority, it behooved leaders to devise tactical forms by which these could be controlled and handled. The musketeers were placed in the second rank of the squares of pike-men, or they were attached to these squares as flank detachments—true bastions of these human redoubts. With the Spaniards and Imperialists, at the end of the century the musketeers fringed the masses of pike-men and opened the engagement as skirmishers. Afterwards they formed into smaller masses joined onto the squares of pikemen; those placed in the interior could not of course fire.

Not only the increase in the number of musketeers, but also a study of the tactics of the ancients on the part of the Hollanders, particularly by Maurice of Nassau, caused the latter to recognize the advantage of a less deep formation and to adopt the line or echelon system. The division into three great bodies nominally continued to exist, each however was subdivided into several tactical units which were ranged in two or three lines in rear of one another. Such a unit did not consist of more than 500 men, spear-men and musketeers in equal proportion, placed ten ranks deep. The musketeers delivered their fire by the front rank and after discharging their pieces hurried to the rear, so that notwithstanding the slowness of loading an uninterrupted fire could be maintained; to do this with regularity and system a practice or drill became necessary and Maurice of Nassau is to

be considered the founder of this art. The Imperialists and Spaniards adhered to their square masses fringed by musketeers with additional bodies of the latter joined to the flanks; the strength of these great masses was however reduced to 2000 men.

The cavalry too, in the time of Alba and Maurice of Nassau, considerably improved in the execution of close order movements without at first giving up their fire rank formation; in place of the lance, the principal weapon of the middle ages, the sabre and pistol were being introduced.

Concerning the artillery, the invention of grape and canister is to be noted in this period; a steady progress in this arm is not observable. A field artillery capable of being manœuvred was the exception.

#### THE TIME OF THE THIRTY YEARS' WAR.

This period in German history is certainly the saddest—lasting a lifetime—the mercenaries of almost all European nations devastated the country. The maxim that “war must support war” was the universal rule. The Swedish army however, during the short leadership of Gustavus Adolphus, by reason of its better state of discipline was the least terrible. The numerous troops of wives, disreputable women, scamps and people of all sorts generally who lived and preyed upon the income of soldiers, rendered an army a plague and this even in the country of their friends. This following was at times in point of numbers as great as the armies themselves.

In an enemy's country the war assumed the character of a robbers' war and since this could be conducted with greater success by mounted troops, the number of these was increased as in earlier times, so that toward the close of this period, cavalry equalled the infantry and on occasions was even of greater number. The decision of battle again devolved upon the mounted troops, especially after the cavalry of the Swedish King, now reduced to a three rank formation, had been trained to charge sabre in hand, after delivering their first fire. This feat became more easily possible because of the changed condition of assaulting musketeers instead of pike-men. While during the 16th century the solid masses of the latter were expected to bring about a victorious issue by the impetus of their shock, at this time combats of opposing detachments of this arm had become of exceeding rare occurrence—fire action of the doubly effective musketeers now came into the foreground.

The perfection of this fire-action was due to Gustavus Adolphus, who ranged his infantry in six ranks, with sufficient intervals between files, however, so that by doubling the files, the depth of his line was reduced to three ranks without any extension of front. The front rank fired kneeling, and on occasions every musket could be brought into simultaneous use; this system though, of doubling, was but rarely practised.

On the part of the Swedes a lighter musket, not requiring the support of a fork, was introduced; the Imperialists retained the latter for some time to come. Paper cartridges and the use of cartridge boxes simplified the operation of loading—still this was a tedious process.

In the Swedish army there were regiments consisting entirely of musketeers, others were made up of a mixed force of musketeers and pike-men

in about equal proportion. According to regulation the latter were posted in three detachments, two in juxtaposition and the third in front—these were the so-called Swedish brigades of about 900 men and corresponded with our battalions of the present day. Toward the close of the war the front detachment was dispensed with and the simple line formation of six ranks remained—about the middle of the war this too began to be adopted by the Imperialists.

Field pieces were made very much lighter and partially assigned to regiments.

In his battle tactics the King of Sweden resorted to a system of successive lines, this together with the adoption of small units, which were at first reintroduced by the Hollanders, after the manner of the ancients, now received general recognition.

The armies of the period were still small in number, in battle they rarely exceeded a strength of 20,000 men. This circumstance partially explains the long duration of contests, for these insufficient forces were inadequate to retain possession of an extensive theatre of war.

The energetic conduct of war was paralyzed by the frequent conflicting interests of states and the fact that armies were composed of mercenaries who neither belonged to a single nation nor a particular side. The prospect of booty was almost entirely the only consideration which influenced the individual on which side to fight or whose cause to espouse, and a desertion from one to the other during the varying fortunes of war was of common occurrence.

The maintenance of the nationality of the Swedish regiments in the army of Gustavus Adolphus, by receiving additions from that country alone, was an entirely new feature. These regiments only constituted the minority of the army with which he had entered German territory; the majority of his soldiers were German, English, Scotch and French.

#### AFTER THE THIRTY YEARS' WAR: FREDERICK THE GREAT AND HIS TIME.

The war which had lasted thirty years virtually converted forces into standing armies; it was easier to provide for them in winter quarters than to dismiss them and then bring them together again the following spring, and since after the peace of Westphalia hostilities were still continued—and almost incessantly for half a century—standing armies came into existence everywhere. While during the thirty years' war, the raising of regiments was still managed by and in the hands of colonels who also appointed the officers; the great Elector of Brandenburg now energetically went about organizing a standing army in the present sense of that term. The enlistments were made in his name, he appointed all the officers and his troops were uniformly armed, equipped and clothed. For the time being voluntary enlistments supplied losses. When however constant casualties had created a dearth of soldiers, Louis XIV., of France, imposed an obligatory recruitment upon his subjects, which in those days was looked upon as something unheard of. In Germany too, about 1700, there began to be a lack of those who cared to fight. The strict discipline of regular armies in which a system of individual robbery was not tolerated, the wretched manner of living

during long intervals of peace and the very meagre prospect of advancement offered nothing enticing.

Frederick the 1st of Prussia had, in addition to his regular army, organized a militia force to be used in defense of the country and which consisted only of residents in districts of his domain. He also put down the opposition of the nobility and town governments by the introduction of his Canton system in 1733 by virtue of which all citizens and peasants, with few exceptions, were declared subject to military service—to each regiment a district was accordingly assigned for its recruitment. To spare his own subjects, half of the regular army was enlisted in other countries, and outside the period devoted to drill (March 20th to June 1st) the first named were granted furloughs for three months and later on for nine months per year. However, since the term of service was for life (subsequently for twenty years) and as the furloughed men, even when employed as farm-laborers, were required to wear uniform under pain of corporal punishment if neglected, the youth of the country escaped from this military burden in crowds notwithstanding threats of the severest punishment. Many enlistments too being effected through deceit and force, even prisoners having been put into the ranks (the Saxons, 1756), desertion was the order of the day in spite of constant precaution and the penalty of hanging.

Then the authorities attempted to attach soldiers to their garrisons by having them marry, and there were regiments in which quite as many as half of the men had wives and children. The rolls of the time show a very different state of affairs from the present; besides representatives of the different German nationalities, there were Poles, Swedes, Hungarians, even Swiss and French. Half the men were over thirty years of age, among them veterans between fifty and sixty. The soldier was looked upon with contempt and his society avoided by the people. It was generally considered a misfortune to be obliged to serve, and every one sought to escape this burden. The corps of officers consisted almost entirely of the nobility of the country; the line of demarkation between them and their men was a pronounced one. There was no essential change in the raising or composition of armies, from the manner described, until the close of the 18th century; in Prussia none until 1806.

The increased effectiveness of the fire-action of infantry had at the end of the thirty years' war resulted in the adoption of a line formation in six ranks. Pike-men were gradually sinking to a less degree of significance but did not finally disappear from armies until the invention of the flint-lock and bayonet, about the year 1700.

The custom of seeking a decision by fire-action alone had become so general that it even extended to the cavalry, who would approach the enemy, fire a single volley and then endeavor to break into his formations at a gait scarcely more rapid than a trot.

Cavalry at this time too, because of its clumsy formations, possessed but inferior manœuvring powers, so that, notwithstanding its great numbers, it did not cut any figure in bringing about an issue in battles.

The infantry, on which Frederick William I. had bestowed his especial care and of which his successors made such skilful use, became the model

for all Europe. Leopold of Dessau, its distinguished instructor, had by the introduction of the iron ramrod (1718-1719), the adoption of a uniform calibre (1704) and the perfection of drill, brought close order fire-action to the highest degree of effectiveness, though there was little heed given to deliberate aim in connection with this fire, owing to the fact that muskets had straight stocks; for execution a great number of chance hits were depended upon. The battalions, advancing in line side by side at an even step of 75 per minute, began to open an uninterrupted fusilade on approaching to within 200 paces of the enemy on whom the first rank fired kneeling. If the enemy failed to give way resort was had to the bayonet, as actually took place during the Silesian wars. Characteristic of the battle methods of the time, were long lines and a delivery of rapid fire, hence the term "line or fire tactics."

This close order fire-action which had been developed to the greatest perfection was the only fire-action employed; there was no skirmishing in extended order. During marches through defiles and timber the Austrian mountaineers became very troublesome but the Prussians did not understand using anything better against them than detachment volleys. This condition of affairs is partially explained by the unreliability of the elements composing the army, for it was necessary to adopt tactical formations which would prevent desertions in the field. For this same reason the king was obliged to caution his generals against bivouacking near woods. How was it possible then to disperse these same men as skirmishers in a covered country where control over them would have been lost at once? It is to be observed, that in the army of Frederick the Great there was but one organization,—never more than 700 strong,—which fought as skirmishers in one sense of the word. These men were foresters and understood that after a period of service they would be restored to their original positions. This fact made it possible to trust them in open order actions. Provided with good rifles their training had made them expert marksmen, in contrast with the infantry whose practice simply enabled them to fire rapidly. Besides outpost duty in securing against the enemy, it was particularly required of them, in connection with the Hussars, to keep watch over the balance of the infantry.

Making use of wooded or broken country was not understood nor was it desired. Both parties preferred bringing about a result on level ground where it was possible to handle their long lines. Woods and villages, far from being positions of advantage, as in battles of the present time, were only sources of embarrassment.

No one seemed to comprehend the proper use of cavalry which was made up of sufficiently good material. Frederick the Great, however, elevated this arm to a point of excellence beyond that of any former period as a result of the regulations he prescribed for it, which even now serve as models, and because of the manoeuvres it practised under his personal supervision. At the time of its organization the cavalry was also materially increased, so that in battles its strength was equal to that of one-third the infantry.

The Prussian cavalry, which, since the day of Rossbach, had but a



double rank formation, excelled that of other nations in the training of the individual trooper, its ability of being easily manœuvred and in the impetuosity of its attack. The cavalry owed its great effectiveness not only to the ability and excellent leadership of Seidlitz and Zieten, but also to the line formation of the enemy which was favorable for its charges. Although at this time the range of the musket was scarcely 200 paces and there was no reliance to be placed upon its going off in damp weather, cavalry attacks directed against the front of the enemy were generally repulsed (battle of Molwitz); while those aimed at the flanks were certain of great results (the regiment of Beireuth Dragoons, at the battle of Hohenfriedberg, 1745, rode down 21 battalions, captured 5 guns, 66 colors and made 4000 prisoners).

The artillery was divided into battalion artillery and artillery of position; the former consisted of 2 or 3 light pieces assigned to each battalion. These were drawn by the gun detachments through intervals of the first line and to a point 50 paces in front of it, so as to be within 500 paces of the enemy; at 350 paces they opened with canister. The artillery of position was of heavier calibre and organized into batteries of ten pieces, which were attached to brigades. These opened the battle, but owing to their want of mobility were rarely able to take up a second position. Frederick the Great was the first to use a horse artillery.

The battle formations almost invariably consisted of two lines, the infantry in the centre, battalions being placed side by side in a continuous line—the cavalry on the flanks. The second line, of less strength, really served only to protect the first in rear and to fill up the gaps. It was not employed in the sense of a reserve, for it followed the first line at a distance of 300 paces and soon became involved in the action.

As it was not thought possible to fight in any other manner than in these long lines—a column formation was not understood—everything depended upon the rapidity with which these lines could be established. Troops therefore camped in order of battle, or marched in it, in so far that the respective lines broke into column by the flank or to the front; the lines were then restored by a wheel of subdivisions or by forming front into line. Forming front into line is an invention of the Prussians, which the regulations of 1743 are the first to mention. Before this a deployment from column into line necessitated two changes of direction by those in rear to reach their places. This new regulation having been kept a secret for some time, caused the Prussian army to excel others in better manœuvring capacity.

In his battles Frederick the Great was almost always the assailant and generally made use of his oblique order of attack, *i. e.*, he directed his assault against one wing or flank of the enemy's position. His retired wing formed a sort of reserve.

Since the rows of tents in camp corresponded with the lines of battle to be formed, it was much easier to ascertain the position of the enemy than would be at all possible now.

The keen perception of the king in recognizing vulnerable points, the rapidity of the movements of his army, the awkwardness of his opponents



in executing changes of front, were the factors which generally brought success; battles were bloody and of short duration. Want of sufficient pursuit was a matter for surprise.

The manner of supplying armies of the time exercised an especial influence in the conduct of campaigns. During the thirty years' war subsistence was obtained by forced contributions, which generally degenerated into a devastation and plundering of entire sections of territory. The evil results of this course were not wanting, for it happened that operations had to be abandoned for lack of supplies on which to maintain a force in a country already pillaged. The troops of Louis XIV. having suffered want in the Palatinate, which they had themselves impoverished, that monarch decided (1690) upon the establishment of depots of supplies, which were located in the numerous fortified cities along the border of his realm. This system of furnishing supplies was thereafter adopted for all other armies, and Frederick II. perfected it to the greatest extent. The question of supplying the most necessary article of subsistence, bread, was the all-important consideration. Everything else was obtained through sutlers, by purchase in open market, or in case of urgent necessity by requisition upon the people. Starting on a march the army had with it 9 days' rations of bread and 9 of flour, which latter was baked in portable ovens transported for the purpose. This baking process consumed two days out of every five; in the space of 18 days therefore it was possible to make 12 marches, provided however that the troops could certainly find a new supply of bread at the point of destination to be reached on the 19th day. If however troops were dependent upon supplies following from the point of departure, or compelled during an advance to establish additional magazines, the sphere of operations was very much reduced. It was an impossibility to take along the quantity of grain required for the numerous cavalry, and this had to be obtained in villages and from fields. A system of foraging therefore became an important feature in these times. It was only in exceptional cases that the Great King levied contributions (on the occasion of invading Saxony, in 1756, and on the march before the battle of Leuthen, when the inhabitants furnished subsistence for the army). It is to be assumed that he did not wish to adopt this system, on the ground that his well organized trains rendered him superior in point of efficiency to his enemies; whereas had he pursued their system, the mobility of the opposing forces would have become equal and theirs would have been the greater advantage because of their divided armies.

In winter-quarters in the enemy's country the army was not only subsisted from the country, but also recruited.

Owing to limited means of men and money and the fact of being restricted by consideration of bases of supply, a methodical system of war resulted which had for its principal aim the accomplishment of unimportant political results, such as the capture of a fortress or province by means of artful manœuvres, the threatening of lines of communication, or the occupation of an unassailable position at the sacrifice of the smallest amount of bloodshed.

Frederick the Great was the only one of his time who had the proper

conception of the true purpose of war, viz.: the annihilation of the enemy's army in battle. The accomplishment of other objects involved resulted as a consequence of this one. Strange as it may seem, neither his contemporaries nor those who came after him understood him in this respect. Prince Henry said of him: "my brother's constant aim was to engage in battle; his sole art consisted in that."

Prevailing views therefore remained unchanged. The theories of learned military writers had for effect a constantly increasing departure from energetic and resolute action by attaching greater importance to consideration of the character of the country than to the enemy. They finally settled on the notorious cordon system—an entire scattering of forces.

#### THE FRENCH REVOLUTION AND RECENT PERIOD.

After the seven years' war, the Prussian line tactics were generally adopted; though in France not without opposition, for there the application of column formations had its advocates. A prelude to recent times is found in the American revolution, during which the colonists, by nature and necessity expert hunters, opposed the British lines in their extended order formations of experienced marksmen. Such a system is the very natural result of a want of military training. The decisive step, though, occurred in France.

When in the summer of 1791, Prussia and Austria assumed a threatening attitude, the National Assembly, which had become the ruling power after the flight of the king, issued a call on July 1st of that year for 169 battalions of volunteers. These first 100,000 volunteers were such in reality. While discipline under the officers elected by them was inferior enough, they, together with those of immediately succeeding levies, were more representative of the French nation than a standing army could be. When the allies entered France the Legislative Assembly declared the country in a state of peril and decreed that all citizens were subject to military duty against the common enemy. Repeated calls for large numbers of volunteers followed one another in quick succession and though the name of volunteer was retained the enlistments were compulsory and gradually led to a universal obligation for military service (from 1798 exemptions were allowed and soon after the furnishing of substitutes was permitted. In place of universal obligatory service, conscription was introduced).

At a single step, war became the cause of the people whose means were unrestricted as compared with regular armies which, separated from the nation, depended for effectiveness on the funds available in the treasury. The energetic conduct of war was entirely changed thereby and it was Napoleon above all, who, totally disregarding old views, again sought for a decision in battle; he penetrated to the very heart of his enemy's country and generally dictated a peace in his capitol.

A training such as the execution of line tactics demanded was not possible with the quite undisciplined masses of the French republic and a system of columns in connection with lines of skirmishers was adopted as a matter of course. A relentless levying of contributions was a natural consequence, arising from want of a well organized train to haul supplies from.

the depots. While this at times was not unconnected with many difficulties, still it had the advantage of rendering the army more mobile than those which adhered to the old system. With the increasing growth of armies a subdivision into fractions became necessary. In the succeeding wars of the republic the organization of divisions took place in all three arms of the service. Napoleon found in existence the changes in tactics above referred to, and they had been partly made without his influence. By reason of his victories they met with European recognition and were patterned after in all armies.

It was Napoleon particularly who knew in what manner to make the most effective use of his reserves. Having discovered the weak point in the position of his opponent, he would concentrate many guns into a single battery and prepare the attack for his Guards, which would frequently not be delivered until the enemy had thrown all his force into the fight. Another characteristic of the Napoleonic system consisted in making the most of a victory by an active and energetic pursuit. It was also something entirely new to use cavalry in advance of the army for exploring duty, a species of useful activity almost forgotten by 1870. Tactically, however, cavalry made no progress under him, for by attacking in column formations (as at Aspern, Leipzig, La Belle Alliance) its power was but partially utilized. With reference to the employment of cavalry on the battle-field, we have in recent times returned to the practices of our Great King.

The organization and battle tactics of European armies were, up to 1866, substantially those immediately following the War of Liberation.

The infantry constituted the most numerous and essential arm; cavalry was reduced to at most one-eighth the entire force.

Different states had also, to a greater or less extent, developed a system of reserves introduced by them, and the majority of the rank and file subject to military duty in case of war were furloughed during peace time. The Prussian system of recruitment was the most comprehensive. This system, up to 1866, required but from 2 to 3 years with the colors out of a total 19 years of service. By virtue of the law making military duty obligatory on the part of all Prussian subjects, the furnishing of substitutes not being allowed, and the fact that the term of service was a short one, entirely changed the character of the army. Since then the army has become the "Nation in Arms"; the uniform, down to that of the private soldier, is a badge of honor not permitted to be worn by disreputable men. The composition of the corps of officers has also undergone a change. Not birth, but intellectual endowments entitles the applicant to admission into its ranks. An expression of this higher educational standard in all grades of the army is found in the development of the application of the company column, the first beginnings of which date back to the War of Liberation—though there was no regulation concerning it until 1825. Its important features were not recognized until the invention of the percussion cap in the early forties, when it had become possible to depend upon the fire of infantry in uncertain conditions of weather (at the battle of the Katzbach the majority of the muskets could not be discharged).

A still further development of company column tactics was perfected

after the introduction of the needle-gun and confined to Prussia alone, where the events of the Italian campaign of 1859 and the deductions derived therefrom by others did not produce confusion.

The Austrians had gone into this war armed with the Lorenz rifle on which they based great expectations as against the French smooth-bore gun. When these expectations failed of realization and they found themselves constantly beaten by the impetuous charges of the French, the blunders of the leaders were lost sight of in the search for causes leading to their misfortunes. These causes were finally attributed to the manner of fighting and led to the very contrary conclusion that success in the future would have to be looked for in bayonet charges. In 1864 these shock tactics met with a small measure of success against the smooth-bore of the Danes, but in 1866 they failed most completely under the fire of the breech-loader. The Austrian losses at times were three and four-fold those of the Prussians. After these experiences, close order formations in the first line become of questionable value.

The war of 1870-71 has undoubtedly demonstrated that the decision of infantry encounters has been transferred to the skirmish swarm.

After the Austrian war, the changed use of cavalry divisions in front of the army for screening and reconnoitring duty and the massing of artillery under a single command became the proper course as shown by results,—this has been generally adopted.

The features presented by the Russo-Turkish war of 1877-78, owing to the peculiar characteristics of the theatre of war and of the Turkish army, will have to be accepted with due caution. The dismounted action of the Russian cavalry was frequently resorted to with success. The defense of Plevna, covered by earthworks, was the most prominent feature of the war; here a poorly trained army, tactically, repeatedly and with most bloody results repulsed charges by the delivery of rapid fire from behind hastily constructed trenches and redoubts.

In a future war for Germany the following factors too might operate to necessitate tactical changes:—the tendency to again use cavalry in battle as a fighting factor; shrapnel with its greater power of execution and the small calibre rifle in connection with smokeless powder.

While all these matters are being considered with reference to our methods of fighting, still the separate questions involved can only be decided by the events of a greater war.

## THE BEARING OF RECENT DEVELOPMENTS IN THE MEANS OF DESTRUCTION ON THE MEDICAL SERVICES IN TIME OF WAR.

By SURGEON-CAPTAIN F. P. NICHOLS, M. S.

(From the *Journal of the United Service Institution of India*.)

I N appearing before you to read a paper with so formidable a title, I trust it may be allowed to disclaim any special knowledge of the subject, and to urge that my province is only to open a discussion, leaving it to others with wider experience to give us their views and opinions. My efforts will be limited to bringing before you the main points on which, as I think, arguments will hinge, and thus trying to limit the differences with which a discussion on a wide subject is always threatened.

The main ends for which experts have lately been striving, in connection with my subject, seem to be the following :

- 1st. Concealment of fire by the use of smokeless powder.
- 2d. Increased effectiveness of rifle fire by weapons of longer range.
- 3d. Carriage of an increased number of rounds by diminution in weight of cartridges.
- 4th. The concentration of fire by means of repeating or magazine arms.

It will be my duty to point out what effects these innovations may have on the number of wounded in future wars, on the distribution of wounded, and on the severity of wounds ; as also what changes in the services for transport or treatment of the wounded may be rendered necessary in consequence.

In doing this I need, I think, only allude to what is grimly called civilized warfare. In battle with foes equipped less up to date than ourselves, such for instance as we meet with on our Indian frontiers, the advantage of these innovations will, it seems to me, be entirely in our favor—the moral effect of a hailstorm of bullets, suddenly delivered from an unknown quarter, appears to outweigh the possibly lessened stopping power of the smaller projectile, and the protective action of smoke. Thus it seems reasonable to assume that the proportion of our wounded will not be greater, and although that of the adversary will, on the same showing, be more, we have not yet reached to such a pitch of philanthropy as to provide extra ambulance for their needs. In the matter of arms also I shall confine my remarks to the rifle, as it is well known that the greater proportion of casualties are caused by this weapon (about 63 per cent.), and although probably the new explosives will add to the number and gravity of wounds caused by large projectiles, no special changes in character need be anticipated.

I believe that Surgeon-Major Bourke, M. S., last year gave you such a lucid description of the means laid down for the removal and treatment of the wounded in war, that I need do more than remind you of :

"The first line of medical assistance" composed of "regimental bearers", and "bearer companies," extending from the fighting line to the "collect-

ing station;" and "the second"; from the "collecting station" by the aid of wheeled transport through the "dressing station" to the "field hospital"; and it will be remembered, that the more important point in the end line was the "dressing station," where the wounded first have their injuries thoroughly examined, and where urgent operations may have to be performed.

It is of the first importance to have this "dressing station" at once out of actual fire and as near the fighting line as possible, in order on the one hand to have leisure and opportunity to tend the wounded without the disquieting effects of bullets, and on the other, to shorten as far possible the transport of badly wounded men to the nearest point of effective aid. This distance has been estimated at about 1000 yards from the "collecting station," which should itself be immediately in rear of the 3d line of the attacking force, say 1500 yards from the firing line; thus bringing the "dressing station" within 2500 yards of the firing line.

It is evident that any change involving the movement of the "dressing-station" towards the rear, thus increasing the distance between it and the "collecting station," must necessitate a longer journey for the wounded, and also, if a continuous stream of carriage is to be kept up, an increase in the number of ambulances and personnel. The "collecting station" being necessarily more or less under fire can scarcely be affected, except that possibly some operations of an extremely urgent nature may have to be performed there, owing to the added risk of carriage to the dressing station.

I am scarcely competent to speak of the effects of the use of smokeless powder on tactics. No campaign has yet been fought in which it has been used, and the experiments of continental autumn manœuvres of the last two years tell us little except of its puzzling effects. According to the *Times* correspondent at the Austrian manœuvres last year, the results were most bewildering;—whole brigades annihilated without knowing the direction from which they were attacked; heavy artillery fire represented by a mere film of smoke; and the Berlin correspondent of the *Morning Post* speaking of the German manœuvres of 1890, remarks on its demoralizing effect on the enemy and the greatly increased certainty of aim, leading to increase in the fighting area and destructiveness at longer ranges. The very interesting Prize Essay of the *Royal United Service Institution* for 1891 is well worth reading in this connection. It is a most exhaustive analysis of the possible changes of tactics resulting from modern weapons and explosives, based on the latest continental field manœuvres, but, as the author admits, the whole question is very problematical.

At all events, I think it will be allowed, that the dangerous area must be increased; that fighting will take place over an extended line of country; and that absence of smoke will cause the aim to be more accurate at the longer ranges and infinitely more deadly at the shorter; that briefly the tendency will be to increase the number of wounded over a larger area, and so render it more difficult than ever to afford effective relief.

I now come to speak of the general use of rifles of comparatively small bore, carrying small hardened bullets, having a much increased range and



flatter trajectory, with consequently greater initial velocity or force, and fitted with magazines which make them capable of firing a larger number of cartridges in a given time.

Most of the great powers have now adopted rifles of the above description, differing little in general type, as far as concerns our present purpose; of them our own, the Lee-Metford, may be taken as an example.

Its range of aimed fire is up to 2900 yards; it carries a small bullet, calibre .303, made of lead enclosed in a capsule of nickel, whose initial velocity is 2000 feet per second; and it is fitted with a magazine containing ten cartridges, which can, if necessary, be fired in the space of 30-seconds.

How will the use of such weapons as these on both sides influence the number of killed and wounded and, in the latter case, the severity of wounds?

Speaking generally, the destructive action of weapons appears to increase in direct ratio to their range, their initial velocity or force, their power of penetration, and the rapidity with which they can be discharged. Thus Professor Longmore in his classical work on "gunshot injuries" speaking of the change from smooth-bores to rifles, says: "The sustained energy of projectiles discharged from rifles gave to combatants a vastly extended range, over which a severe fire could be maintained, and to military surgeons a proportionally increased number of severe wounds to treat," and again: "Speaking roughly the change from smooth-bores to rifled weapons gave ten times the range with greatly increased precision of aim; while the change from muzzle-loading to breech-loading weapons, without any diminution of range or accuracy, has increased the capability for rapidity of fire tenfold."

It is a curious fact, however, that statistics of killed and wounded in various great battles and wars do not support the view that increase of wounded is in proportion to improvement in weapons. Thus, while the match-locks and flint-locks used at Blenheim caused a loss among our troops of 23 per cent. and the flint-locks at Waterloo the same, the percentage of killed and wounded during the Crimean campaign, where the Minié and later the Enfield rifle were used, was only 15 per cent. while at Königgratz the combined forces of Austrians and Saxons only lost 14 per cent.; and the Prussians, the victors, 7 per cent.; lastly, during the Franco-German war of 1870 Engel gives the German statistics of loss for the whole war at 13 per cent.

The apparent contradiction may, I think, be accounted for by considering the enormous increase of modern armies, which is so great as not to permit the whole or even a large fraction of the force to come under fire; for all these statistics are as to the proportion of killed and wounded to the total force in the field, not to that part of the force actually engaged; and in order properly to estimate the deadly effects of improvements in weapons of war we want particulars, such as may better be gleaned from the pages of a historian, of actual engagements and the resulting casualties. In the *Journal of the Royal Service Institution* for 1862 is a paper in which the writer, from a review of such statistics as I have just given, is actually led



to question the superiority of the rifle over the smooth-bore as a destructive weapon! This is an instance of the misuse of statistics which is so common in our day, and which throws discredit on most valuable sources of information. In order to draw accurate deductions from statistics, it is obvious that the general conditions of the various factors must be the same.

However, I think that all here will be prepared to admit that the general effect of all improvements in fire-arms from the old match-lock, the flint-lock, the percussion smooth-bore, the Enfield, Snider, to the Martini-Henry, has been to increase the number of wounded in war proportionally to those actually engaged, and for purposes of time and argument, they must take my word for it (not, I think, with hesitation) that the wounds inflicted have been *pari passu* more severe and fatal.

And now to proceed to the particulars in which the new rifle differs from the old.

Its range being considerably greater, it is evident, without touching on questions of tactics, that troops will be longer under fire, both unaimed and aimed, before coming into contact; and these loose formations, that will be probably adopted to avoid loss, will tend to greatly increase the area of fighting, and so to spread the wounded over a larger extent of country.

The initial velocity or force of the bullet is increased which, besides rendering the range longer, makes the penetrative power greater—so great that doubtless one bullet will often pass through many men. Longmore says: "The rule is that, if the velocity of a bullet be increased, its destructive power will be augmented proportionally with the square of the increase in velocity"; that is, for instance, if bullet A at a given distance, say 1000 yards, travel at twice the rate of speed of bullet B, then from that cause alone, taking no account of difference in shape or weight, its powers of inflicting injury will be quadruple that of B. We shall find later I think, that this statement requires modification.

The application to the rifle of a magazine containing ten rounds which can, if necessary, be fired in less than the time it took to discharge three rounds, must make its destructive power, other things being equal, almost four times as great as the Martini-Henry.

I would now direct your attention to what seems to me the most important change in the new rifle. I mean the bullet. Much criticism has been directed against it both by military men and sportsmen, whose arguments have mainly been that its lessened size and weight mean lessened stopping power. Their arguments have been met by quoting past experience, in which it is shown that all improvements in war-rifles have been accompanied by a progressive diminution in size and weight of the bullets. and yet, so far, there have been no complaints of insufficient destructiveness.

A consideration of the decrease in size from the Snider to the Lee-Metford bullet, and a comparison between the cartridges used in the Snider, Martini-Henry, and Lee-Metford, will suggest that there should be grave reasons for introducing so radical a change. The essence of war is to put out of action as many of your opponents as possible, and in the case of the

bullet the question is to attain such a mean between portability and destructive power as will secure the largest number of casualties with the smallest weight to be carried by the soldier. Formerly the destructive power was mainly looked to, latterly increase in number of rounds has been thought of more importance; and it is recognized that it is better to encumber your enemy with a host of wounded than to kill him; and since a comparatively slight wound is sufficient to incapacitate a soldier for his work, to damage him more than is necessary for this is clumsy and cruel.

The result has been the small bullet of modern armies, the Mauser .311, the Männlicher .315, the Lee-Metford .303; and though to many we seem to have arrived at a point past which it would be hazardous to go, Italy and Roumania have lately adopted a still smaller calibre, .255, while Austria and Germany are contemplating a change in the same direction, and Dr. Kepler of the Swiss army is in favor of adopting a bullet of .196 calibre as sufficient to place men *hors-de-combat*.

But there is another difference in the new bullet which seems not to have at first attracted the attention it deserves, and which, taken with its decreased size and increased force, will, I think, render it more interesting to military surgeons than any other—I mean the hard material of which it is made.

It is really the main point in which the new rifle differs from the old, for it is a difference in principle not only in degree; whereas initial velocity, longer range, increase of rounds, quicker discharge, diminution in size and weight of bullet, are all qualities in which the Lee-Metford rifle differs from the Martini-Henry as the Martini-Henry differs from the Snider. We have in this great increase of hardness a new departure, of the effect of which we have practically no experience.

*A priori*, what should we expect to be the difference in wounds made by a bullet, small, light, and hard, impelled by a greatly increased force, from those made by a larger, heavier, and softer one with a less initial velocity? I think we should expect a smaller and more clean cut wound in the softer tissues (flesh); and in the hard tissues (bones) less crushing and more splintering.

In the successive bullets which have been used by us in warfare, we have a gradual diminution in size and weight from the old round smooth-bore to the long wedge-like Martini-Henry. All these bullets have been progressively more destructive, but it is by no means easy to find out how much of that destructiveness was due to the bullet itself, and how much to the power which impelled it. The change from round to conical balls of less weight, though accompanied by an increase of velocity due to rifling, which tends to obscure the results, yet appears to have itself changed the character of wounds on the side of severity by reason of—

1st. The wedge-like action of conical balls, which makes their penetrative power greater, enabling them to pass through soft tissues, and to splinter bones instead of being turned by or buried in them.

2d. The substitution of several diameters for one, so that while a round bullet could only make a hole the size of itself, the conical bullet makes a hole possibly as small as its smallest diameter, but often, owing to "wob-

bling" or "deflection," one corresponding in diameter to its own long axis. The shape of the new bullet is still more conical than that of the Martini-Henry, and this in itself will give more penetrative power.

The gradual decrease in size, which accompanied this change of shape, does not so far appear to have lessened the destructive action, nor does the diminution in weight; but it is at least arguable whether by further reducing the size by .147 of an inch and the weight by 163 grs., we have not reached the limit of effectiveness.

When, however, we come to consider the difference in consistence between the Martini-Henry and the new Lee-Metford bullet, we are face to face with a problem in which we have practically no past experience to guide us. Some hardening indeed was effected in the Martini bullets with a view to increasing their penetrative power, but this hardening (which consists in an alloy of tin and lead) is not sufficient to prevent the bullet receiving the impress of a thumb-nail, and I am not aware of any important changes in gunshot injuries attributed to it. It breaks or bends in contact with hard bones, and its wounding power is thereby much increased by reason of its own change in shape, and the destructiveness of the splintered bones to which it partly communicates its force. Will the new bullet follow the lines of precedent, or will its great increase in hardness introduce a new feature into the wounds of the coming war? Longmore remarked in 1877: "Should steel or any similarly hard and coherent metal ever be found capable of being economically employed in fire-arms, many of the ordinary features of gunshot wounds as they at present exist, will be materially changed"; and it will now be my business to bring before you a few recent experiences which tend to confirm this prediction.

In the Departmental Blue Book for the medical services for 1890, Surgeon-Captain Parry Marsh, medical staff, records two cases of accidental injury by bullets from the new rifle; and he subsequently read a paper in the Royal United Service Institution calling attention to the probable difference in character of wounds caused by the new bullets. The cases he gives were (shorn of technical details) as follows:

Case I. Was that of a laboring man who, while at work in rear of the rifle ranges at Aldershot, was shot through the fleshy part of the right thigh by a bullet from the new rifle. He was one mile and 800 yards from the firing point, and the bullet had ricocheted twice, once from stone and once from water. After passing through the man's thigh it still had energy enough to bury itself deeply in the ground, and was found undamaged and unaltered in shape in any way. The man did not fall when struck, nor did he know he was seriously hurt: the wound was clean cut with very little bruising, much like what would be produced by a long narrow-bladed knife, and it healed, as such wounds do heal when treated by modern measures, rapidly and well. The man was discharged from hospital four and twenty days after.

Unfortunately for the man but fortunately for science, he died some time after of bronchitis, and careful examination revealed complete healing of the bullet track, so that the only indication of his injury were the two scars at entrance and exit.

Case II. Was a Woolwich operative who was struck, while at work, with one of the new bullets fired at about 100 yards from him. He too was struck in the thigh and the bullet passed through the flesh without touching the bone. The wounds were in this case more ragged, but their main character was the same, and he was discharged well 32 days after admission. He too was not knocked down by the blow, nor were there any serious symptoms such as shock.

From these two cases Parry Marsh argues that, in future wars when the new small-bore rifles are used, wounds are likely to be less severe, accompanied by less shock, uncomplicated with lodgment of balls, and prone to heal rapidly, permitting men to return to the ranks during the course of hostilities. As he justly remarks, injuries such as these inflicted with the Martini-Henry bullet would probably have lost the men their legs if not their lives, but it must be remembered that in the Franco-German war, where the principles of modern surgery were first applied, and in our own Egyptian campaigns, many wounds made by the Martini-Henry bullet healed with astonishing rapidity, and all the credit for the quick recovery of his patients must not be given to the bullet which caused the injuries. Further I would suggest that the very absence of bruising and laceration carries with it a danger of its own. The comparative rarity of severe bleeding on the field of battle is well known to be due to the crushing to which the tissues and with them the blood vessels are subjected, and I see no reason to doubt that a bullet which can punch a clean hole through a man's thigh, would do the same to any large vessel in its path; the hard, sharp, elongated bullet at its high rate of speed will cut like a knife, and this means bleeding and death. Colonel Boonen Rivera, who acted as brigade commander in the Chilian war, specially reports on the large number of dead compared with the wounded. He estimates the number as four dead to one wounded; this is a very great contrast to the usual estimate of one dead to five wounded, and, if true, requires some such explanation as I have ventured to suggest, viz.: increased fatality from wounds of blood vessels. It is, however, dangerous to argue from the particular to the general when your particulars are few.

Experiments carried out with the new rifle some three years ago by Professor Smith, A. V. D., and Sir Thomas Longmore, medical staff, appeared to show that, when bones were hit by the new bullet, the effects were even more disastrous than with the Martini bullet, and more lately some French experiments with the Lebel bullet have been published, which tend to show almost explosive action at short distances. Professor Smith states that in his experiments the wounds of bones and joints "were simply appalling, the shafts of long bones were reduced to fragments and joints converted into cavities containing nothing but bone dust"; and Surgeon-Colonel Godwin, professor of military surgery at Netley, considers that the French and English experiments taken together justify him in his opinion: "that the characters of the wounds thus produced by these small enveloped bullets are likely to be of a nature that will try the surgeon to the utmost, and will not be conducive to the soldier's speedy return to a military life." All these experiments were, however, made with a softer bullet than is now in use, and on dead horses, not on living men. It is said that Roumania is experi-

menting with a soft bullet designed to "set up" on impact, that is to spread at its base and so cause a severer wound, a fact which, if true, is significant.

Without going into further details, as time is short, I may say that, so far, all the wounds of bones that have occurred in men tend to show that the amount of damage is proportionate to the resistance offered; soft bones, such as those of the wrist and ankle, and flat bones, as the skull and shoulder blade, are perforated by clean cut "key-hole" wounds; while hard bones, such as the thigh, arm, and legs, are broken and splintered.

Surgeon-Captain Parry Marsh has kindly informed me of two recent cases at Aldershot, both fatal. In one case the bullet passed through two doors, and then through both thighs of one man and one thigh of another; the bones in the first man hit were splintered and the vessels divided. In the second case a man shot himself through the heart, the wounds of entrance and exit were quite small and clean cut, a great contrast to several similar cases that I have seen caused by the Martini-Henry bullet.

In the late Chilian war about half of the victorious army was armed with Männlicher rifles, the Balmacedists carrying weapons of larger bore. This accounts for the comparatively small number of wounds caused by the small bullets, which are almost identical with our own. According to Dr. Stitt of the United States army, the flesh wounds and those of flat and soft bones were clean cut and healed readily, many wounds through the hands and face, for instance, being sent out of hospital in a fortnight without deformity, and with perfect movement. Wounds of the lung also were noted to be much less fatal than usual. "With long bones," he says, "unless the projectile simply passes through without fracturing, the immediate result differs but little from that produced by a lead bullet, and strange to say, the length of bone comminuted (that is broken into fragments) is greater." Nothing shows more graphically the comparatively humane character of the new bullets, than the fact that all those wounded by them had left hospital, while 300 of those wounded by large bore rifles remained. These results Dr. Stitt considers due to the fact that the bullet is so hard that it never loses shape or splits up, even on striking bone. Several other surgeons present at the Chilian war confirm these observations and opinions of Dr. Stitt. On the other hand, I may perhaps quote the remarks of a great German authority, Professor von Bardeleben, a surgeon of extensive experience in military surgery. "The new projectile," he says, "is by no means so humane as it is sometimes called, because, within similar periods of time and under equal conditions, it kills and wounds more men than the old bullet; but the wounds which it causes, if not immediately fatal, open to the surgeon a more promising field for exercising his skill."

On the whole I think we may say that in the next war we must be prepared for a large increase of wounds amenable to treatment, a comparatively small increase of severe wounds, and a high proportion of dead. The labors of the surgeon will be increased, but the proportion of recoveries will be larger.

Next as to the modifications required in our medical services to meet these changes.

The great difficulty of the medical services in late wars has been the con-

centration of enormous number of wounded in a short space of time within a limited area, and the impossibility of dealing satisfactorily with such a mass of suffering. I may again quote Professor Longmore's words :

"All must admit that the changes in tactics resulting from the alterations made of late years in military weapons, especially from the introduction of breech-loading rifles (the result of which, I may remark, was mainly increased number of rounds discharged in a given time), have greatly increased the difficulties in the way of giving adequate early attention to the wounded on certain parts of the field. The great disproportion in the losses among troops at different parts of the field of action in modern warfare, and especially the excessive numbers that fall wounded on certain portions of the ground within brief periods of time, create special difficulties in surgical administration. The great lateral extent, too, now generally taken by the troops in front, and the whole formation of the fighting line, are other impediments to early surgical assistance."

How much will these difficulties be increased by the widened area necessitated by a rifle carrying twice as far, and by a multiplication of discharges at short ranges, such that it can only be compared with a hailstorm of missiles? Truly, as far as weapons are concerned, the results of the next European war are horrible to contemplate. But lately Professor Bilroth of Vienna in a much discussed lecture on the adoption of a new rifle for the Austrian army said :

"One of the cruelties of modern civilization is that, while all countries are in competition to produce weapons of the most absolute precision and giving the deadliest result, little or nothing is done to make the medical services keep pace with these improvements. Every new gun carries further and wounds at a greater distance than its predecessor, and this means that the shelters for wounded have to be set up at a greater distance from the line of battle. Thus all ambulance duty to be effectual should be proportionately increased."

And in a speech on the same subject at the Austrian delegations,\* he reiterates these opinions and says that he is convinced and he is a man of large experience, that, in every form of fighting, modern weapons will cause an increase both in the number and severity of wounds.

As at present laid down in regulations, an army corps, numbering 37,431 of all ranks, has with it 118 medical officers (including 13 quartermasters). This number includes the administrative medical officers of the force, the medical officers doing duty with regiments, and those with the ten field hospitals and the six bearer companies. The establishment of warrant officers, non-commissioned officers, and men of the medical staff corps for the same is 798. Omitting the details at the base (2447), which leaves an army corps almost 35,000 strong; this gives medical officers in proportion of 1 to 333, and medical staff corps as 1 to 44, while the number of hospital beds would be about 1 in 35. These numbers are based on the principle of the evacuation of wounded rapidly from front to rear, the field hospitals being regarded for the most part as glorified "dressing stations," until with the

\* See *Journal of United Service Institution of India*, No. 93, May, 1892.



advance of the army they are left behind as hospitals on the lines of communication.

General Lord Wolseley considers that: "in a battle between two European armies, the total loss will never exceed 10 per cent. on either side, whilst frequently it will be less than half that amount; and if you provide for the care and transport of wounded men at the rate of 6 per cent., irrespective of whether they may or may not be exposed to fire, you will have done all that is necessary." Judging from past experience only this would not seem optimistic, but taking into account the probable increase due to modern arms, I should call it a dangerous statement. The wounded on the German side during the Franco-German war varied in different battles from 6 per cent. to less than 1 per cent., but some account must be taken of the sick incidental to a large force, in ordinary circumstances amounting to 5 per cent., and certain to be largely increased by the accidents and privations of a campaign. Colonel Furse, in his work on military transport, acknowledges that that for the medical services is most difficult to estimate, on account of the varying circumstances, the best authorities giving estimates differing as widely as 15 and 5 per cent., but he shrewdly observes that the only wise course is to have a considerable reserve always ready for use.

Surgeon-Major Riordan, an officer of great experience, considers that sick carriages should be provided for 10 per cent. of the entire force. The ratio of wounded to troops engaged he puts at 1 : 9, and that of killed to wounded (and here most authorities are agreed) as 1 : 5. All these estimates have been based, as also our own regulations, on the experience of the 1870 war.

Let us see what steps the greatest military continental nation has taken. Since 1871, and specially since the new regulations of 1878, the German ambulance system has been steadily improved. Every increase in the troops has been accompanied by an increase in the medical services. Each army corps has three "sanitäts detachments," answering to our "bearer companies," but double their strength. The German military ambulance department can count on 150,000 beds, of which 40,000 can be made available in 24 hours. The official staff is supplemented by the volunteer staff of Red Cross and other societies, and Dr. von Coler, the head of the military medical department, considers that the whole organization has kept pace with modern improvements.

Major Galde, in a speech in the German Reichstag on February 18, 1892, stated there was no doubt that in the next war we should have a much larger number of wounded, and then, turning to the question of ambulance organization, he said: "In 1870 our wounded were 116,821 men, *i. e.*, 14.8 per cent. of the total number in the field; of these 17,000, in round numbers, died at once, so that there remained a percentage of 12.6 for surgical treatment. For the new war we calculate on a loss of 20 per cent., that means that an army corps would have 7000 casualties; of these there would be 1200 killed and 5800 wounded, and of the latter about one-third seriously injured and two-thirds with slight injuries. For this number we should dispose of 150 surgeons and 300 ambulance assistants. Thus each surgeon would have charge of 12 or 13 seriously wounded men and 26 men with slighter wounds."



In the discussion which ensued, Professor Virchow remarked that 20 per cent. would represent the average loss, but not the loss in any single battle. Under the altered circumstances, the loss in many of the engagements would be much above the average of the campaign.

Thus we see that the Germans, recognizing the changed circumstances, have logically increased their ambulance to cope with the expected increase in wounded.

The number of wounded struck down in a very short time in modern battles, before these later innovations of magazine rifles, etc., has been so enormous, and the difficulty of removing them sufficiently quick to the rear so great, that it has occurred to more than one military surgeon whether the rule of speedy evacuation to the rear is, in all cases, the best. Doubtless, from the point of view of the general commanding, it is greatly to his interest to get rid quickly of all his wounded, leaving his front clear, and in the event of retreat not being hampered with all the enormous impedimenta of sick carriage; it is also said to have a bad effect on the *morale* of an army to have its sick and wounded too much in evidence; but since the protection offered by the Geneva Cross to the wounded in "ambulance" hospitals, and since the development more recently of volunteer help in the field, by means of Red Cross Societies, etc., the question has somewhat changed, and *fin-de-siècle* humanitarianism may possibly ask if the interests of the wounded need be so completely subordinate to the military necessities.

The great strides also made of late years in the science of surgery, since the adoption of the principles associated with the great name of Lister, have too made possible the successful treatment of wounds that before were thought hopeless and left to their fate; so that now it is possible to predict recovery from many most severe wounds, if only they be placed in favorable conditions. For instance, quite recently it has been proved that what were a short time ago considered necessarily fatal wounds of the head and body may, thanks to treatment logically developed from Listerism, be treated with fair prospects of success, provided again that they be placed in favorable circumstances; circumstances the direct opposite to those pertaining to the present method of speedy evacuation.

I do not wish to bore my audience with technical details, but when I mention that speedy application of clean dressing, immobilization of the part wounded, perfect quiet, and above all clean air and surroundings, are absolutely necessary, it will be evident that these are least likely to be found in the necessarily rough and ready aid in the field, the long transport to efficient surgical assistance, and the constant movement necessitated by the present method of evacuation. It has therefore been suggested that these more serious wounds should be treated in temporary impromptu shelters erected on the field of battle itself, until able to bear removal, that if the army advance they should have medical assistance left with them, that should it retreat they should be allowed to fall into the enemy's hands under the terms of the Geneva Convention.

Speaking as a surgeon, I cannot help seeing that the principle is correct; speaking as a soldier it appears risky to throw aside, even in part, principles

that up to now have been acquiesced in by all authorities, medical and military.

But change of circumstances requires change of methods, sometimes even of principles, and in face of improved surgical results, likely to be still more marked in the future from the simpler character of wounds caused by the new bullets, and of changed conditions resulting from the Geneva Convention and the great development of Red Cross Societies, and still more, from the humanitarian tendencies of the age, I do not envy the political position of even a successful general whose triumphs are won at an unnecessarily cruel cost to his wounded.

Taking the German estimate of loss as 20 per cent. on the number in the field (regarded as an underestimate by so great an authority as Virchow), let us briefly consider the increase of medical services needed for one army corps in our own army. I shall use whole numbers for the sake of convenience.

The total of an army corps at the front (without a cavalry division) is roughly 35,000 men; of these (at the low estimate of 5 per cent.) 1750 will be constantly sick, the total wounded will be 5800, and of these 1900 will be serious and 3900 slighter wounds. For these 7500 odd patients I reckon that 150 executive medical officers will be necessary, giving roughly, 15 serious wounds, 12 sick, and 26 slighter wounds to each; this is allowing a higher proportion than the German estimate; besides these, there will be five administrative officers, and there should be a reserve of 10 per cent. for casualties, the total amounting to 170 medical officers. This is slightly larger than the German estimate on account of differences in organization, the whole control and command of the medical services being with us carried out by the medical staff. The rank and file would of course have to be increased in proportion.

Passing next to hospital accommodation. On the same estimate beds would be required for about half the sick and one-third of the wounded, *i. e.*, 2700, and for this number, supposing the army corps to be operating in a country where shelter cannot be obtained, no less than 27 field hospitals would be wanted, but this, in a war in a civilized country, is unlikely. The circumstances vary so much that it is most difficult to give a fair estimate; perhaps 15 field hospitals, amounting to 1500 beds, supplemented by stationary hospitals, and evacuation of all but very serious cases, might be sufficient.

The bearer companies also must be increased or strengthened, many medical officers being in favor of the latter; thus assimilating them to the German "sanitäts detachments" of 200 men. But here we must remember that in increasing the numbers we are also increasing the possible wounded, for their province is to advance under fire almost to the front; and as a German surgeon lately remarked, "War is no humane institution"; we are fully prepared to practice humanity as far as possible in war, but we must not sacrifice a larger number of lives in order to effect the uncertain saving of one. He was speaking, however, of a service in which 1000 men are detailed to transport the wounded of an army corps. I think myself that the bearer companies might well be affiliated to the field hospitals, in

which case their strength need not be increased, but their numbers raised to 10.

If, however, as I think will probably be the case in the next continental war, the volunteer help of neutrals be largely employed, we shall perhaps be able to diminish the number of the personnel. The rôle of the Red Cross Societies appears to me to be in the "hospitals on the line of communication"; and in the treatment on the spot of such dangerously wounded men as can bear no transport. In the first they would serve under our own administrative officers, the executive work falling almost entirely to them. On the field, such cases as could not bear transport beyond the dressing station, might there be provided with some extemporized shelter and appliances, and handed over to their charge until able to be moved; the latter course would necessitate a hospital being eventually formed on the field of battle.

To meet these views some more mobile arrangement than field hospitals seems advisable, and what is called the tortoise wagon, a combination of ambulance wagon and small hospital is well adapted. Perhaps 5 out of the 15 field hospitals might be composed of these, and after an action they could be placed in any convenient part of the field, and handed over temporarily to the volunteers. Each of these wagons is complete in itself for the accommodation of 20 men.

But in order to effect any improvement, organization and practical experience are necessary. That volunteer aid societies should be organized in time of peace in order to be of use in time of war, would seem a truism; and so would the dictum that bearer companies and field hospitals should be constantly exercised in their duties, were it not that the very opposite of this is the fact, owing I suppose to the expense involved.

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### SINGLE WIRE, NON-INSULATED TELEPHONY.

(From *Scientific American* Supplement.)

THE characteristic of the effort made by electricians in recent times to favor the extension of telephonic applications is a return to simple apparatus of compact construction. Some have tried to modify the receivers, and in this order of ideas we may recall the fact that the Aubry apparatus gives good results, as is also the case with the Roulez receiver constructed at the artillery shops.

As regards transmitters, the multiplicity of the microphones produced in recent years has, so to speak, overwhelmed the researches of electricians and prevented them from pursuing a practical and definite object, and they have been content for some time to seek perfection of regulation and strength in the apparatus.

Aside from these two important points, the great preoccupation has been the installation of aerial, subterranean, or submarine telephone lines, the improvement of the processes of manufacturing the cables, the increase of their conductivity, the augmentation of the properties of the insulants, and the explanation of certain phenomena of induction, the effects of which

very justly inquired electricians in particular, and all persons in general, who, in utilizing the telephone as a mode of communication, found themselves doomed to suffer from this state of things.

Along with these multiple questions, certain labors have been performed that, by themselves, present a certain interest. Certain conditions of establishing lines have been determined that promise great surprises for the future, and great enterprises, such as that of long-distance telephony, have been brought to a successful end. In this category of studies the establishment of the Paris-London line may be regarded as an event.

But, along with the engineers who interested themselves in this idea and who solved important problems in so happy a manner, there worked other



FIG. 1.—UNWINDING OF THE WIRE.

investigators, who, proceeding in an entirely different manner, reached results of just as vast a range. After the experiments on telephony without wires of the lamented Bourbouze, following the experiments on telegraphy with naked wire of Captain P. Cardew, we have now the telephonic processes of Captain Charollois. It is these latter experimentations, still very recent, that we shall submit to deep examination, being certain that the popularization of the results acquired can but aid the more in the development and extension of a system that by itself is destined to a great future, from several points of view, as we shall see.

The arrangement that Captain Charollois was studying as long ago as 1888 utilizes the peculiar properties of a special conductor—the Martin bimetallic wire with steel core covered with copper. This wire is stronger

and less oxidizable than the wires in daily use in electrical applications. It is now to be found in the market, and its relatively low price specially recommends it for hundreds of installations in which it may advantageously replace the ordinary conductor.

The characteristic of the Charollois arrangement resides essentially in the use of this wire, which, unwound naked upon wet or dry earth, or even upon grass covered with dew, or in water (in which it may be submerged for a certain length), constitutes a telephone line which, ending at its two extremities in two magnetic receivers, transmits, by earth return, the induced currents circulating between these two receivers, and, at distances that are sometimes considerable, permits of exchange of conversation and acoustic signals under conditions that are eminently practical and curious;

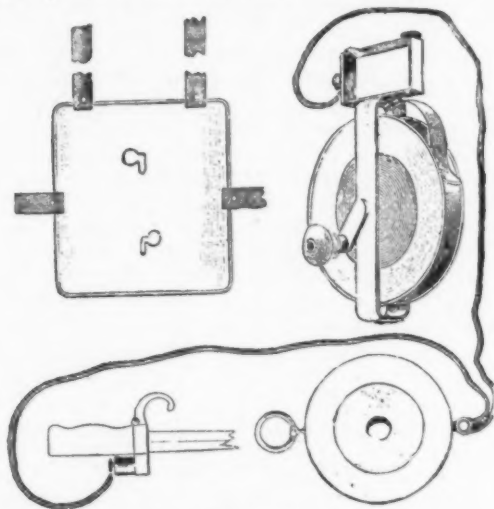


FIG. 2.—BREAST PLATE AND REEL.

practical in the sense that these lines do not necessitate a special set of instruments, and that the installation, effected in a summary manner, is exceedingly simple; and curious in that the theories generally admitted on the subject of the propagation of currents by naked wires seems to be demolished.

In this category of experiments there are several phenomena that might give rise to a theory which, if not new, is at least singular and upon which we shall not dwell, confining ourselves simply to a mention of the experimental conditions of trials that we have witnessed and of results that we have directly appreciated.

The experiments of Captain Charollois, with the aid of the arrangement devised by him, and which we have just analyzed, relate to two applications that present more than one point in common. The principal one relates

to the adaptation of this process to military operations, and the second to industrial and domestic uses.

Let us proceed, then, in the same order for the description of the experiments. In the application to military operations, the Charollois arrangement, which gave excellent results in the grand manœuvres of the North in 1890, and of the East in 1891, includes the organization of a telephone service capable of being understood at a distance of a mile, and putting in communication the elements of an army corps by means of intermediate stations arranged upon the line in any manner whatever. The establishment of the line offers some peculiarities that it is well to bring into prom-

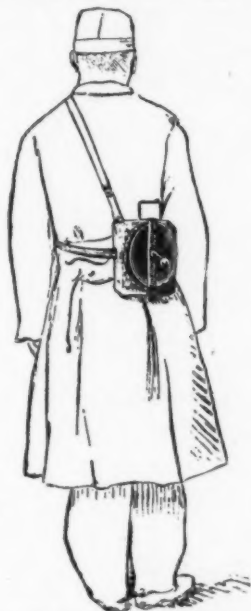


FIG. 3.—METHOD OF CARRYING THE REEL DURING A MARCH.

inence. Let us say, in the first place, that the diameter of the wire is only of secondary importance as regards results, and were it not for fear of breakage in a rapid unwinding, the finest possible bimetallic wire might be preferred.

Upon the whole, the choice is indifferent. Experiment has been made with the same success with wires of 0.15, 0.02, 0.03 and 0.06 of a millimeter without a sensible diminution of the sounds furnished to the receivers.

In view of an organization that may be shortly expected, a complete materiel has been devised for realizing the establishment and taking up of a military line in a very short space of time.

Under ordinary circumstances, the arrangement by relays includes but a

light materiel, the entire equipment being reduced to less than five and a half pounds.

The telephonists are organized in sets. Each set comprises two men. The first (Fig. 1) carries upon his chest a sort of breast-plate held by leather straps. This plate is made of steel and is provided with two apertures for the reception of the pins of the wire bobbin. The latter, which also is represented on a large scale in the figure is formed of a grooved pulley upon which may be wound 10,000 feet of wire. The pulley is held by its axis between the branches of a U shaped iron which carries at its anterior extremity and upon one of its lateral faces the pins designed to fix the bobbin at right angles or parallel with the breast plate. Fig. 2 clearly indicates the form and working of the plate and bobbin. Finally, the pulley is con-



FIG. 4.--WRITING A DISPATCH.

nected with a winch that permits of winding up the wire when the line is taken up. Fig. 3 represents the telephonist at rest and equipped.

In the case of communication by cavalymen, the breast plate includes a rod terminating in a small pulley held in a fork and movable in all directions, designed to facilitate the unwinding of the wire.

In all cases, the receiving and transmitting apparatus remain fixed to the strap of the "kepi," and permit of listening or talking and of transcribing a dispatch with the greatest facility.

Figs. 4 and 5 show how this double operation is performed. When the telephonist is at a standstill, he can increase the clearness of perception, by completing through his sabre bayonet stuck in the earth, and connected with the second terminal of the receiver, the return to earth that is effected



in principle through his body itself. So too when it is a question of a cavalryman, the return is constantly assured in an efficacious manner by the shoes of the horse (Fig. 6).

The line, consisting of a wire unwound upon the ground, and hooked to



FIG. 5.—TELEPHONIC COMMUNICATION.

trees, bushes, etc., without any insulation, is laid very rapidly by foot soldiers, cavalrymen, or bicyclists (Fig. 7).

Each set, comprising two men, carries the materiel necessary for the



FIG. 6.—UNWINDING OF THE WIRE BY A CAVALRYMAN.

establishment of a one mile line. It is installed at the extremity of the line and is connected with the line that follows, and, while the second operator remains charged with the surveillance of the line laid by his set, the other

keeps himself in permanent telephonic communication with his original station and the telephonist of the set that goes before him.

Under such conditions it will be seen that the establishment of the line proceeds with great rapidity. The taking of it up is done still more quickly. Fig. 8 represents the telephonist performing this operation. At the last manœuvres, a 14 mile line was established thus in five hours and taken up in one hour.

The passage of a division of cavalry over the wire did not, in the course of an experiment, interrupt the communication of a dispatch that was being sent at the same moment. The line attached to a captive balloon has been utilized for the exchange of orders without any difficulty.

A great advantage of the telephone system is the centralization of the



FIG. 7.—TELEPHONE ON A BICYCLE.

orders. Thus, on the 14th of September, 1891, an order of assault, setting in motion two army corps, was received and put in execution in ten minutes.

Some recent experiments have once more verified the facts that we present, and, not long since, a line of this nature that had been hastily established from the Reuilly barracks to Joinville-le-Pont operated with complete success. In other experiments we have ascertained for ourselves the merits of this telephonic system upon a line installed in a few minutes on the extensive grounds of the works for raising the water of the Marne, at Saint-Maur-les-Fosses. This line, which had a total circuit of 10,000 feet, permitted of making some conclusive experiments. The line was laid on the ground without any supports.

A system of call styled "dog" used in the army has been tried. This call is produced by means of an instrument devised by Mr. Sieur and in

which a wheel carrying a series of strips of steel upon its circumference and passing between the poles of a magnet develops currents of variable frequency, which, circulating in the line, produce in the receivers a characteristic signal perceptible at a distance and imitating the bark of a dog.



FIG. 8.—WINDING UP OF THE WIRE.

Calls for industrial installations have also been devised, and under such circumstances it appears to us that this telephonic system is capable of being used for connecting the interior services of a manufactory, of a mine, or of any kind of enterprise or private installation.—*Annales Industrielles*.

## Military Notes.

### THE DREDGE-STEWARD OMNI-TELEMETER.

**I**N our issue of August 20, 1886, we described a new range-finder, then being brought out by Mr. J. H. Steward, of 406 Strand, London, who assisted the late Mr. William Dredge in its construction. The instrument was primarily intended as a range-finder for military purposes, but Colonel A. T. Frazer, R. E., who has had much experience with the instrument, has found that it makes a very accurate instrument

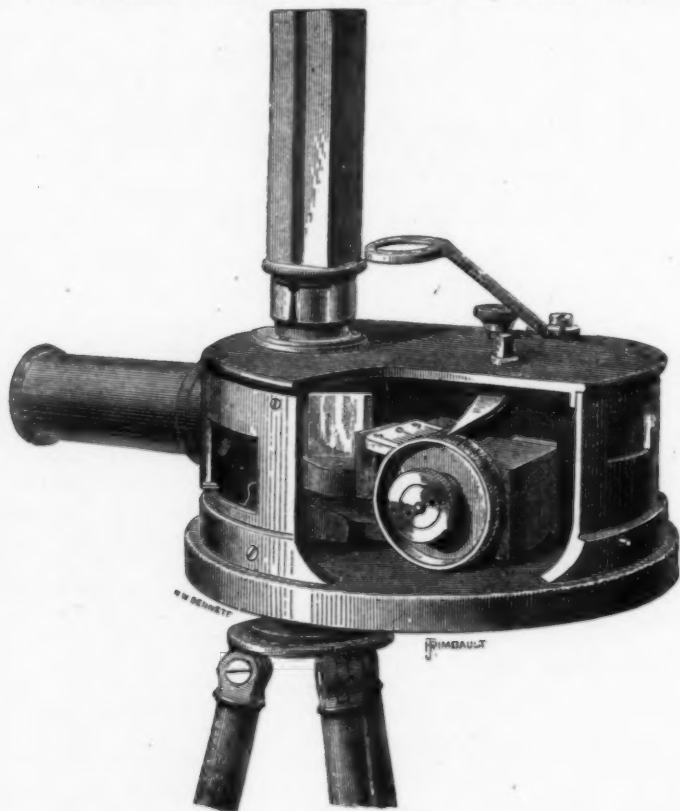


FIG. 1.

for telemetric surveying when used on a plan which we shall describe later on. The general view of the instrument is well shown in Figs. 1 and 2, whilst Fig. 3 shows a section through it. From these it will be seen that the instrument is a modification of the ordinary box sextant, but in place of the two mirrors of the instrument being parallel to each other, when the graduation reads 0, the mirrors of the omni-telemeter make an angle of 45 degrees with each other in this position, so that in looking through the instrument under these conditions the eye

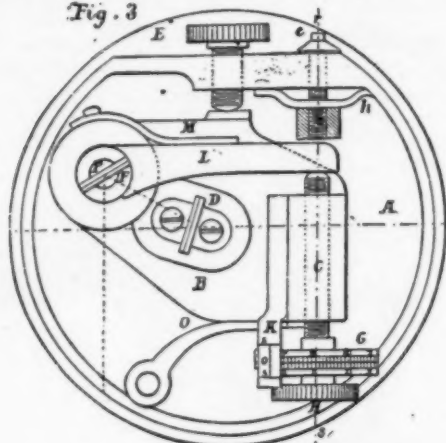


FIG. 2.

of the observer occupies the apex of a right angle, the sides of which are formed by the direct line of sight, and that seen by reflection in the two mirrors. There is still another point in which the instrument differs from the box sextant. In that instrument, as is well known, one of the mirrors, viz., that known as the horizon glass, is fixed in position, whilst the fully-silvered mirror only can be adjusted: In the Dredge-Steward instrument, however, both these mirrors are adjustable. Referring to Fig. 3, D is the mirror which is fixed in the sextant, but which, in the present instance, can be adjusted through a limited range by means of

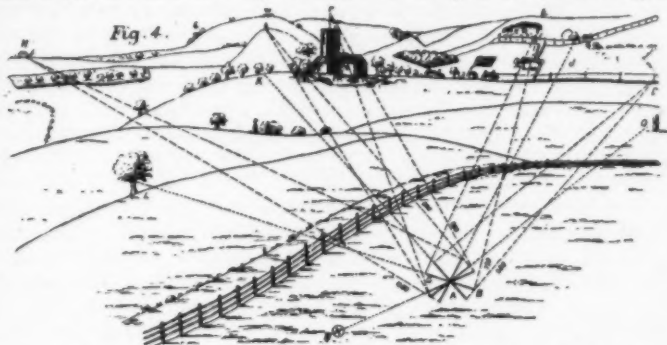
the micrometer screw E. This mirror is mounted on an arm B, which, turning round the pivot F at one end, is kept in contact with the screw E already mentioned by the spring O, and it is by moving this arm that the mirror O is adjusted. At the free end of this arm is a nut C carrying a micrometer screw with a graduated head G, as shown. The other end of this screw abuts against the arm L, on which the fully-silvered mirror P is mounted, and which can, therefore, be rotated through a small

Fig. 3



angle by turning the milled head H of the micrometer screw. In using the instrument to take a range, as A B (Fig. 6), the observer being at B and facing so that the mark lies on its right hand, he views it by reflection in the instrument. The line of sight from the object reaching first the mirror P, is reflected on to the mirror D, Fig. 3, and from it to his eye. The observer, now looking through the unsilvered part of the mirror, tries to find some prominent object C, which he can superimpose on the reflected image of A, without, be it understood, touching the micrometer screw H. When this is done the angle A B C, Fig. 6, is a right angle. Now putting a mark at B, he paces in the direction of C B produced a distance B D = 50 yards, and looking again through the instrument as before, he turns the milled head A until the image of the mark A is again superimposed on C. Then reading the index on the micrometer screw, and referring to a short table attached to the instrument, he reads off instantly the range A B. Usually it is impossible to get a mark C, such that the angle A B C is a right angle, without several trials, and it is here where the advantage of the omni-telemeter comes in, since it is not necessary with this instrument that the angle A B C shall be a right angle. Hence, if a point cannot be found fulfilling this condition, the observer chooses some point that nearly does so. Looking at this object and the mark through the instrument, when the latter is adjusted in its zero position the image of the mark will be to one

side or the other of it. In this case the screw E is turned round, moving the mirror until coincidence is secured, and the second observation is taken at D, Fig. 6, as before. Owing to this adjusting screw E, much less trouble is required to find a suitable mark on which to project the object whose range is sought. In the case of instruments having a fixed base angle, the observer may have to shift his position considerably be-



fore the desired coincidence is obtained. The adjustment allows base angles varying 8 degrees on either side of 90 degrees to be used, and it, therefore, is only in very exceptionally monotonous countries that a suitable mark cannot be obtained with comparative ease.

The instrument has been tested by Mr. John Coles, of the Royal Geographical Society, the author of "Hints to Travellers," for taking a

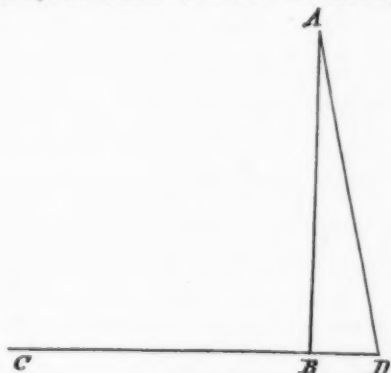


FIG. 6.

round of distances from a central point which can be very quickly accomplished by the omni-telemeter. The best plan of doing this is indicated in Fig. 4. A stick is placed at the point A, and distances of 25 yards measured on each side of it. Then to get any range such as E, a suitable object such as L is taken, and the observations taken at the



points B and C. To take the distance of the point G a man is sent out with a picket to O, and used as the auxiliary mark. For the range of the steeple F the mark M would be used, and J when taking H. In this way a whole round of objects can have their distances ascertained very rapidly. With moving objects two instruments are used, held by observers 50 yards apart, the line between them making an angle of nearly 90 deg. with the object. Both of the instruments having been first set to zero, each observer reflects the other on the object by using the micrometer screw H. The range is then got by adding or subtracting the readings of the two instruments, the sum being taken when the zero line of the two is on the same side of the zero line of the scale K, Fig. 3, and the difference when they are in opposite sides.—*Engineering* (London).

"MOUNTED INFANTRY IN 1816."

*Colonel Marbot's Criticism on General Rogniat's Suggestion.*

With reference to "Mounted Infantry," some interesting remarks appear in a book written by Colonel (afterwards Major-General) Marbot in 1820, entitled "*Remarques Critiques sur l'ouvrage de M. le Lieutenant-General Rogniat, intitulé 'Considerations sur l'art de la Guerre.'*"

The latter was an officer of distinction who had seen a great deal of service in the French army, having, as engineer, directed several important sieges in France, and in 1816 he published the above-named book with a view to reforming the French army. Having, as Marbot says, "been led away by studying Polybius, Vegetius, and other ancient writers, General Rogniat proposes to form our modern armies very much on the model of the Roman armies."

Being evidently aware of the advisability of having rapidly-moving infantry, and bearing in mind the manner in which the Romans are said to have used their "velites," General Rogniat makes the following extraordinary suggestions regarding the training of light infantry or "voltigeurs."

"All the movements in presence of the enemy should be made at the double, and that in place of teaching them the drill and movements actually in use, they should only be made to run, swim, jump," etc. And he goes on to say, "Exercise them to mix and fight with our legionary cavalry, to leap 'en croupe' behind them, etc. \* \* \* Each division (or peloton) of light infantry will be attached to a squadron which it will accompany in all its movements. \* \* \* The light infantry man ought to practice leaping 'en croupe' behind his cavalry man, so that the infantry 'pelotons' can be moved from one place to another as quickly as the cavalry," etc.

After ridiculing and pointing out the utter impossibility of modern infantry being able to perform such circus tricks, and which he denies that even the lightly armed "velites" could or did perform, Colonel Marbot goes on to say: "The idea of making light foot soldiers follow cavalry has, according to my opinion, only been judiciously put into execution under Louis XIII., and at the commencement of the reign of Louis XIV. It will be seen that I allude to dragoons such as they were in their primitive organization. This institution was, as is not ordinarily the case, as perfect as possible at its origin, and degenerated when they tried to perfect it. In

reality, the first dragoons were light foot-soldiers, wearing gaiters, and mounted on country horses. These soldiers never fought as cavalry; they had not swords even, for the musket or fusil was their only arm. They were not formed into regiments, but into free companies, which were provisionally attached to regiments of cavalry, who formed the advance or rear guards, or were detached. These regiments used the dragoons to force or guard a defile, a bridge, a wood, a village, etc. I think that a nation who shall have some companies of infantry thus organized and mounted will be able to use them most profitably." In a note to the above, Marbot adds: "But it is still better to accustom the light cavalry to dismount to guard a bridge, a wood, a defile, a village, and all covered positions, where there is no fear of their being charged by the enemy's cavalry. If they had contented themselves with that in their later trials with dragoons they would have succeeded; but it was impossible that this body of men could do what was required of them, especially in the open field and in presence of an enemy."

In his memoirs, lately translated, General Marbot mentions an incident in the retreat from Moscow very illustrative of the inability of dismounted cavalry to perform the duties of infantry against infantry, and of the fatal consequences, in this instance, at least, of not being able to bring up rapidly a force of infantry at a critical moment.

It appears that Oudinot having taken Bozidoff, was anxious to seize the bridge over the Beresina (on which Napoleon was retiring), but his infantry had not come up, so he directed his cavalry general, Cartex, to dismount three-fourths of his troopers and attack the bridge, which was then held by a very few demoralized infantry skirmishers. The cavalry had partially succeeded when a battalion of Grenadiers came up at the double, and forced them, at the point of the bayonet, to abandon the bridge, which was instantly burnt and destroyed.

A regiment of mounted infantry with that cavalry division would have probably taken and held the bridge until reinforced, and by so doing have saved the French army an immense loss of life, if nothing else.—*The United Service Magazine* (London).

#### ELECTRIC BALLOON SIGNALLING.

A very interesting paper on this subject was read at a recent meeting of the Royal United Service Institution by Mr. Eric Stuart Bruce. The author has devised a system of signalling with incandescent lamps placed inside a captive balloon, the message being conveyed by means of flashes caused by interrupting the current. The usual drawback of an interrupted current does not appear—at any rate to anything near so great an extent as with naked lights—when the lamps are placed in the semi-translucent envelope of the balloon. The after-glow of the incandescent filament—a phenomenon familiar to any one who has switched off an incandescent lamp—is sufficient to so far obliterate the intervals between the flashes as to render working at a reasonable speed very difficult, if not impossible. The obstruction of the material of which the balloon is composed is sufficient to hide the glow of the carbon; although, of course, a part of the illuminat-

ing power of the lamps is lost even when fully glowing, and thus something is detracted from the distance at which the signals can be read. Probably this is more apparent than real. Our own experience is that in reading messages flashed by light, extension of area of the field illuminated largely compensates for loss of intensity. It is desirable not to have the vision too concentrated in reading quickly recurring flashes of light. Of course, in considering this, as in all such matters, the personal factor must not be forgotten; but it is certainly true—at any rate, of some persons—that a faintly luminous body is most apparent when not looked at too directly. Mr. Bruce's system, by which the electric lamps are operated from the ground, so that no person need go up in the balloon, is manifestly an improvement on the plan of using larger balloons and sending up the operators—that is, so far as sending messages at night is concerned, but it must be remembered that a general in the field wants to see as well as to speak, and for this reason the larger balloons are necessary. Again, for day signalling we are not aware that any mechanical device for using semaphores or flags has yet been devised which would be practicable to work from a small balloon. Mr. Bruce has used four different sizes of balloons. The largest has a gas capacity of about 4200 cubic feet and a diameter of 20 ft. The next size will hold 3200 cubic feet, the diameter being 18 ft.; the next 2000 cubic feet, diameter 15 ft.; whilst the smallest contains 1600 cubic feet, the diameter being 14 ft. For military purposes the largest is preferred by Mr. Bruce, and with pure hydrogen the lifting capacity will be over 1000 ft. of electric cable. The smaller sizes, the author says, are more suitable for navy signalling, where reduction of size of balloon is of still greater importance; a statement by no means of universal application, unless it be intended to apply only to the application of Mr. Bruce's system to cases on land where an existing large-size balloon plant is already available. Carriage by sea is generally more easy than carriage by land. Lieutenant Jones in his instructive lecture read before the Institution in February last—a notice of which appeared in our columns at the time—gave the size of the normal English observation balloon as 10,000 cubic feet. This is smaller than the war-balloons of other nations, the French standard size, according to Lieutenant Jones's paper being 19,000 cubic feet. Mr. Bruce attributes the superiority of our balloons in lifting capacity to be due to the comparative lightness of the material from which the English balloons are made, the precise nature of which is kept secret. Mr. Bruce finds the most suitable material to be a thin cambric, which, when coated with varnish of a light color, forms an exceedingly translucent medium. In the interior of the balloon, which is filled with pure hydrogen or coal gas, several incandescent electric lamps are placed. These are in metallic circuit with a source of electricity on the ground, where there is an apparatus for making and breaking contact rapidly. To serve the large observation balloon of 10,000 cubic feet, 84 steel tubes filled with compressed hydrogen are required, each of these being about 8 ft. long,  $5\frac{1}{2}$  in. in diameter, and weighing about 70 lbs. Each of these would contain 120 cubic feet of hydrogen. With the largest of Mr. Bruce's balloons less than half the number of tubes would be required, whilst with the smallest balloon 14 would be sufficient. Mr. Bruce has experienced some trouble in

getting lamps with sufficiently fine filaments to fulfil the conditions necessary for high speed in signalling, but this difficulty he anticipates will disappear when the monopoly, due to the existing patents, expires in a few months, and he will then "have an ideal lamp, fulfilling the requisite of fine filament, moderate voltage, and suitable candle-power." The arrangement for suspending the lamps inside the balloon consists of a holder made like a ladder, so that the lamps are placed one above the other in multiple arc. Six lamps of nominally eight candle-power, but worked much higher, gave signals which were seen at Uxbridge when the balloon was on exhibition at Battersea. The distance is about 16 miles. Experience does not show that the continuous flashing shortens the life of the lamps. The electric cable is made of strands of copper, so as to be very flexible. There is no reason why the holding rope and electric cable should not be all in one, excepting that the latter serves as a guy rope to keep the balloon steady in case of wind. The first cable weighed 40 lbs. per 500 ft. of twin cable, but this weight has been reduced to 30 lbs. for the same length.

As a source of electric power, Mr. Bruce generally uses storage batteries, and when a dynamo is available these answer best. When taking part in the military tournament at Cork, the cells were charged in London, and when they arrived at Cork they needed no replenishment. They were sent back to London, and were found to be nearly fully charged eight weeks after. The storage battery generally used consists of 25 cells; each cell weighs 24 lbs. The size of each cell is 4 in. long and  $7\frac{1}{2}$  in. wide. Its height is  $13\frac{1}{2}$  in. The whole set of 25 cells takes only a space of 3 ft. by 1 ft. 8 in. When a dynamo is not at hand for recharging the cells, it is necessary to have a diminutive engine and dynamo to supply the current; or a small gas engine worked by the hydrogen gas might be used. It is interesting to state that on the occasion of a trial at Chatham by the military authorities, Mr. Bruce's balloon was filled with hydrogen that had actually been used for balloon inflation at Suakim during the Egyptian war, and had been re-bottled. The gas did not seem to have lost much of its lifting power.

The lecturer made some experiments to show that there is no danger from explosion owing to the lamps being immersed in the hydrogen gas. Unless there were a proper mixture of oxygen, there would, of course, be no combustion, and if the hydrogen became diluted to this extent the balloon would no longer float. He also proved by experiment that bullet holes are not so fatal as would at first be supposed, especially if in the lower part of the balloon, owing to the pressure of the gas being upwards.

The great enemy to the captive balloon is undoubtedly wind, but that, naturally, does not apply to the same extent to balloons which do not carry a car or any living freight. The author says that he can do much by a skilful use of guy ropes, and he made a successful exhibition before the military authorities at Stamford Bridge in half a gale of wind.

There can be little doubt of the immense importance that signalling and observation by captive balloons may have in future warfare. There are many occasions in history when such a means of communication might have turned the fortunes of the day. In this respect, however, we cannot do better than quote Mr. Bruce's concluding words: "It is but a few years

ago there was a general shut up with a few followers in a besieged city. Near at hand there were friends to help, but ignorant of the immediate necessity. If from Khartoum there had arisen such an electric signalling balloon as I have described, its flashes of light in the skies would have told the tale of the events below, and perhaps the heroic leader would have left Khartoum a conqueror, with his life spared for the future service of his country that he loved so well."—*Engineering* (London).

#### EUROPEAN SMALL-BORE RIFLES.—THEIR RELATIVE VALUE.

Professor Hebler, whose exhaustive studies on small-bore rifles well qualify him to impartially assess the value of the weapons now in use, contributes a small article to the *Allgemeine Schweizerische Militär-Zeitung* on the relative value of the various rifles used by the armies of Europe. Since the appearance of his brochure, "Das kleinste Kalibre, oder das zukünftige Infanteriegewehr," slight modifications in the rifle itself or in its ammunition have in some instances altered the efficiency of the weapons, mostly, however, as in the case of the Swiss, Austrian, and Bulgarian rifles, to their detriment. Taking the total ballistic performances, or "goodness," solely into account, the Professor ranges the relative value of military rifles as follows:

Spanish .....	7.2 mm. (.283 inch) = 580
Russian .....	7.6 mm. (.299 inch) = 540
English .....	7.7 mm. (.303 inch) = 521
Swiss .....	7.5 mm. (.295 inch) = 519
Belgian .....	7.6 mm. (.299 inch) = 516
Turkish .....	7.6 mm. (.299 inch) = 516
German .....	7.9 mm. (.311 inch) = 474
Austrian .....	8.0 mm. (.315 inch) = 410
Bulgarian .....	8.0 mm. (.315 inch) = 440
French .....	8.0 mm. (.315 inch) = 433
Danish .....	8.0 mm. (.315 inch) = 411
Portuguese .....	8.0 mm. (.315 inch) = 410
Swedish .....	8.0 mm. (.315 inch) = 393

If the whole ballistic qualities, or "goodness," of the rifles could be relied upon under all circumstances, then the classification shown in the above table would be correct. As a matter of fact, however, several of these military rifles have their weak points either in connection with the breech action, or the magazine, or in connection with the ammunition. In order, therefore, to ascertain their practical as distinguished from their theoretical "goodness," it becomes necessary in some cases to make deductions from their performances under the most favorable conditions. In Professor Hebler's opinion, the English, Swedish, Russian, Austrian, Bulgarian, and Swiss rifles are those least to be depended upon, and he consequently makes a deduction of 10 per cent. to allow for their minor defects, whilst he credits all the others with their full ballistic qualities. He thus ranks the rifles into three classes—the first class, including those whose "goodness" exceeds 500; the second class,

those whose "goodness" lies between 400 and 500; and the third class, those whose "goodness" falls below 400.

## FIRST CLASS.

Spanish .....	.283 inch = 580
Belgian .....	.299 inch = 516
Turkish .....	.299 inch = 516

## SECOND CLASS.

Russian .....	.299 inch = 486
German .....	.311 inch = 474
English .....	.303 inch = 469
Swiss .....	.295 inch = 467
French .....	.315 inch = 433
Danish .....	.315 inch = 411
Portuguese .....	.315 inch = 410

## THIRD CLASS.

Austrian .....	.315 inch = 396
Bulgarian .....	.315 inch = 396
Swedish .....	.315 inch = 354

From the above it will be seen that the three improved Mausers hold the first places both from their theoretical and from their practical ballistic qualities, and it appears probable, therefore, that most of the European States, when they decide on re-armament, which they shortly will be obliged to do, will adopt improved Mausers of still smaller calibre.—*United Service Gazette*.



## Reviews and Exchanges.

Professional Papers; Royal Engineers—Vol. XVIII., 1892.\*

VOLUME XVIII. is an interesting issue of this well-known professional periodical. It treats of electric welding, Egyptian irrigation, alternating currents of electricity, the application of works to irregular ground, hydraulic machinery, and closes with tables of the English service ordnance, including guns, ammunition, carriages and slides or, as termed by us, chassis; it will be noted that disappearing carriages for 10-inch, 9.2-inch, and 6 inch high power guns are mentioned. The illustrations of the papers are numerous and well executed, and aid greatly in the understanding of the text.

The paper on electric welding will be of special interest to artillery officers, because it explains in language easily understood the Thompson-Houston system now used in fabricating shells and shrapnel for both army and navy in this country, together with the advantages of the process over old methods of welding. It may be added that shells 8 inches in calibre are already turned out at the works of the Thompson Electric Welding Company at West Lynn, Massachusetts, and that probably it will not be long before our new 12-inch mortar shells for high explosives can be furnished at prices but little exceeding those of the old cast-iron patterns for black powder.

The paper on Egyptian Irrigation describes improved methods of operating introduced by the English engineers, which will be of interest to those engaged in applying similar methods in the arid regions west of the Mississippi.

The paper on alternating currents of electricity is technical, and treats of their generation, measurement, distribution and application. It is illustrated by numerous diagrams and presents the subject in a lucid manner.

The paper on the application of works to irregular ground was prepared for the use of cadets of the Engineer division at Woolwich. It lays down certain principles of geometric construction by which a parapet may be adapted to the site in a manner to secure the best fire over the enemy's approaches and at the same time to defile the interior of the work from his view, and as much as possible from his fire. The discussion deals specially with permanent fortifications.

The paper on hydraulic machinery treats, in a simple and intelligible manner, the ordinary lifting and transporting apparatus, hydraulic tools, and hydraulic motors. Among the pumps discussed is the Worthington, which originated in this country and forms part of the machinery used to operate our new hydraulic lifts for 12-inch guns.

H. L. A.

### The Armies of To-day.†

This is a conglomerate volume made up of certain articles originally appearing in *Harper's New Monthly Magazine*. As a sample of typographical work it is creditable even to the celebrated publishers who give it to the world. The illustrations are ex-

\* *Professional Papers of the Corps of Royal Engineers*. Edited by Captain W. A. Gale, R. E. Chatham: 1892.

† *The Armies of To-day, a Description of the Armies of the Leading Nations at the Present Time*. Harper & Brothers, Publishers, New York, 1893.



cellent and numerous, and so captivating that they claim attention before anything else can be looked at. Some of them are decidedly curious; truer than truth, as we are able to perceive it. The eye cannot register the instantaneous attitudes of an animal in motion, and so they seem grotesque when caught by the camera. Nothing but the camera would care to vouch for the drawing of the cuirassier's horse on page 165; or even "The Rural" on page 387. No doubt both are correct. The sun is not a humorist. Still they are odd. The human eye cannot isolate these attitudes, and so the human mind is unwilling to accept them. In other words the human eye cannot see the truth. Still, we may be permitted to ask, why illustrations should exhibit the *real* which no man ever saw, rather than the *apparent* which everybody could appreciate?

Eight authors have contributed to the volume before us, seven of whom write under their own names. The eighth, "A Russian General," has good reasons no doubt for withholding his. The names given enhance the value of the articles. The writers are entitled to speak with authority on the subjects they discuss.

The first article is from the pen of General Merritt. In it he sketches the composition and character of the army of the United States, showing in a concise way, what it is, whence it comes, how it expands to meet an emergency and how it contracts when the emergency is over. The nucleus on which this expansion and contraction are effected is the Regular Army. It has never been the pet of the Republic. On the contrary it has always been regarded with suspicion. In spite of its distinguished and patriotic services; in spite of the fact that it has always been the faithful servant of the state, trusty and reliable against foreign foe or domestic enemy; and in spite of the fact that it is confessedly essential to the national existence, it has always been regarded with suspicion by the people at large, and treated with neglect if not injustice by the government. Even the heroes of the Revolution who helped to create the nation were shabbily treated when the war was over; a proceeding which bore bitter fruit in 1812. When that war was recklessly declared the United States was practically without an army. The surviving veterans of the Revolution were either too old, or had too lively a recollection of former treatment to volunteer with avidity, and the raw levies, hastily collected and hurried into the field met only with misfortune. With the single exception of New Orleans every undertaking proved a failure.

Such experiences ought to have taught wisdom to the most obtuse statesman. And they do seem to have had some effect, for a peace establishment of 10,000 men was promptly provided for. But this was merely the effect of terror. As the terror died out suspicions revived, and in 1821, the army was remorselessly reduced to its lowest terms again. The Mexican War brought about another temporary expansion accomplished chiefly by the enrollment of volunteers; but the Great Rebellion found the nation defended by less than 12,000 men.

During the War of the Rebellion the army again expanded until it numbered at one time, over a million of men; and as it was opposed by a less numerous army no better trained than itself, it was just able to save the nation from destruction. This fact is very generally accepted as proof of its invincibility, and also, that, when combined with its former adversary, it might defy the world with impunity. Of course General Merritt says no such thing. He has no such belief. But the belief is too generally held and too frequently enunciated for the nation's good. It is high time to have done with such balderdash. As a nation we ought to be old enough now to face facts whatever they are. Although some nations never seem to reach that grade of maturity. A steady diet of falsehood and flattery will make truth very unpalatable. But we hope better things of the United States, and we are glad that General Merritt speaks plainly on this subject. He tells the nation that our militia is not now and

never has been fit to take the field in the first days of a war (p. 50). We should like to substitute *months* for *days* in that quotation. But we thank the General for even whispering the terrible truth. Coming from such a fountain it ought to have some effect. He says "Enthusiasm and patriotism will not only not gain battles, but may add to the gravity of disaster" (p. 52). These words are timely as they are truthful. We have imbibed too many French notions on these points. Defeats due to our unsoldierly qualities and untrained condition, have been explained away by such expressions as "overwhelming numbers," "masked batteries," and the like. But we were brave—we were always brave. As if that was any excuse for defeat. Courage to stand up and be shot at "Has not, perhaps, been denied to any man," says Carlyle. Even ragged losses, dressed up in uniform and "trained a little," will stand up and "have the souls blown out of them" for a shilling a day. Courage is not peculiar to American troops. There are brave men in every army. Anglo-Saxon pluck is a very good thing to have, but it will not win battles for us, and we should not measure our military strength by assuming its existence and counting national noses.

The organization of the army, especially that of its ponderous staff departments—some of which we are sorry to see misnamed—is clearly and concisely stated and very properly eulogized. Perhaps these staff departments are well adapted to the work they would have to do in the event of war, although that fact is by no means generally accepted. But few will be willing to admit that "The entire army of the United States could be put in motion, equipped for war service, in six hours or less time" (p. 9), by them, or any other agency.

The hospital corps, though the youngest organization in the army, seems to be the peer of any of the departments so far as organization is concerned; and the engineer corps, which might be called the oldest, seems to have lost none of its youthful vigor. This corps has had much to do with making the United States army what it is. It created the Military Academy, and supervised it for many years, and thus imparted a French flavor to our military ragout, which it,—the corps,—had inherited from its French ancestors.

But we are dwelling too long on these departments. Interesting as they are we must turn our back on them if we would ever reach our goal. But rapid progress over these pages is impossible. Everything is interesting, and almost everything calls for comment. Here is the Artillery School, established we are told in 1824, and held to be a school in name only, because "no attempt was made at any system of recitation or study" (p. 32). So a school is not a school unless it is a temple of cram. We believe that the original founders of the Artillery School of Practice, had the true conception of what such a school ought to be. The fighting artillerist for whose benefit the school was organized, is an artist, and his art cannot be acquired from books. No art can be acquired in that way. He has to learn to play upon an instrument—a 12-inch B. L. rifle for instance—and he needs to know, only such things as will help him to do it. He cares not a brass farthing about the way the instrument was made. That is altogether other people's business. But the instrument having been made, and proved by the proper parties, is now turned over to him, and it becomes his duty to learn how to play upon it. He is an apprentice rather than a student.

General Merritt thinks the school is approaching "The Lecture System" whatever that may mean. If it is held to mean that facts can be crammed into people more satisfactorily by reading things in their hearing, than by making them do the reading for themselves, "The Lecture System" will prove a delusion and a snare. There is nothing in it as a system. What the Artillery School needs is a lecturer, and lecturers are hard to find. Among masters of science not one in a thousand can lecture

effectively. Among army officers the proportion must be less. But the master of an art can teach and train apprentices without difficulty. He not only tells them how, but shows them how, and then makes them *do* it, not once or twice but many times. And that is the only way to learn how to play the instrument. The test of proficiency should be, what can you do? not what do you know?

But enough of the schools. Let us look at what is said of the recruiting service. The maintenance of an army by the voluntary system is always uphill work. In spite of the fact that "a term of service, judiciously spent in the army, is an advantage to a young man" (p. 49), which we admit; or the assertion that it is "second only to a university course," (*ibid*) which we do not admit, the recruiting service—a very expensive department—finds the greatest difficulty in keeping the ranks of our little army full. The dapper recruiting sergeant has to paint the service "in rose-colored tints" (p. 47) before he can secure a recruit. Out of over 60 millions of people we find it difficult to maintain an army of 25,000 men. Why so? Why should the people believe that when "Johnny has gone for a soldier," he has gone to the dogs? The fact is, the people hate the army. It seems to be inherent in the race to do so, and yet the race has always been a warlike one. Our cousins across the water were worse off once than we are. But the cause remains a mystery. What will explain it *there* will not explain it *here*. It seems to be an instinct. Reason has nothing to do with it.

Lord Wolseley, the author of the article on the British army, is a very pleasant writer. He is easy to read and there is never any doubt about his meaning. He gives us, not only an excellent account of the British army as it is, but an interesting description of that army as it has been. And the most striking and unaccountable feature of that description is the unpopularity of the army. He says that with the solitary exception of Cromwell's time, the British army has never been able to attract really good men into its ranks. Even during "Marlborough's glorious decade, the press-gang" had to do the recruiting (p. 70). The war with Napoleon was fought with immature lads, wholly unfit for active service, because good men could not be coaxed into the army (p. 73). And even to-day, when the term of service has been shortened, and the life of the soldier has been improved in every way, precisely the same kind of material presents itself for enlistment.

Lord Wolseley blames the pay. He says Cromwell's recruiting sergeants could compete in the labor market on even terms with other employers. Cromwell paid his troops so well, that he could pick his men. The very best were eager to enter the ranks. And the result was "the best, most disciplined, most sober, and most highly trained army we have ever had in England" (p. 86). But government goes into the labor market *now*, offering boys' wages, and consequently only boys enlist (p. 87). Well, that perhaps is the general case. But there must be exceptions. There must be other inducements. We read that 53 sergeants became officers in 1886, 51 in 1887, and 45 in 1888. One colonel says that he has "thirty sons of gentlemen" in the ranks of his regiment (p. 81). And Lord Wolseley himself declares (p. 87) that "The charms and romance of a soldier's life, the variety of scene and incident which army service affords to all ranks, will never fail to attract the roving, adventurous and ambitious spirits of all classes." Manifestly the recruiting sergeant has better bait than boys' wages to fish with. And the recruits thus secured are just the material among whom leaders may be found. They are not influenced by pay. It is the life of a soldier that attracts them. Not the hum drum life of the barrack yard, but the exciting life of active service and adventure. Lord Wolseley says, "Our army has far greater practice in war than that of any other nation" (p. 94). The British Empire is rarely at peace all round. Little wars are almost always in progress, and while few laurels can be gathered in such contests they are admirable schools for officers and

men. Even "immature lads" who have experienced the peculiar sensation which the whistle of hostile bullets induces, have received an education and a training which schools or autumn manœuvres could never impart. And marksmanship, fire-discipline, target practice; what of these? Lord Wolseley says "Queen Victoria's soldiers learn their lesson with ball cartridges fired in real warfare" (p. 94). Good again, we say. The school is an excellent one. If there were no other way of accounting for the splendid qualities of British infantry, that alone would suffice.

We shall not enter into an analysis of British military strength as measured by numbers alone, because we do not believe in that method of measurement. But we may say that an examination of the article under discussion will show that even from that point of view, it is much greater than most people believe.

The German army of to-day is a vast and not altogether homogeneous organization. In reading Colonel Exner's article the wonder continually grows in one's mind as to how such an immense machine can be managed and maintained. We pride ourselves not a little in this country upon the fact that our war-time records are so complete that it is possible for us to determine the whereabouts and status while in service of any one of the several millions of men who entered our armies during the Rebellion. But when we consider that the German military authorities keep track of every man-child born under the flag, from his birth until he reaches his forty-fifth year, our record keeping sinks into insignificance.

Colonel Exner covers his ground so completely, treating of army recruitment, organization, distribution, and administration, that we find it impossible in our space limits even to glance at all the headings of his article.

We notice that the German army consists of 20 army corps, all of which are localized except the Prussian Guards. We notice also that the 15th and 16th Corps, stationed in Alsace and Lorraine, are not recruited from these provinces, but draw their men from distant parts of the empire. The recruits enrolled in Alsace and Lorraine take the places of the men thus drawn from a distance.

Of course the bulk of the recruits are drafted into the infantry, each battalion receiving an annual contingent of 200 or 230 men (p. 121). Recruits are selected for the cavalry (p. 126), and also for the artillery and rifles. We are astonished to find that the standard of height for infantry is only 61.8 inches (p. 121).

Germany has always maintained more cavalry than any other nation except Russia. Counting Cossacks and other irregulars, Russian cavalry outnumber the German by 116 squadrons. Germany has 93 Regiments (p. 122).

The German artillery consists of two distinct branches, with nothing in common but the name. The more important, or at least the more numerous branch is the field artillery. It consists of 43 regiments. These are organized into 20 brigades and distributed among the army corps (p. 126). They are considered a permanent part of the corps.

The garrison artillery, comprising 31 battalions (p. 128), occupy the frontier fortresses of the empire (p. 129).

There is nothing peculiar about the organization or duties of the engineers and pioneers of the German army; but the railway troops deserve a passing notice. They consist of 4 battalions of Prussians and 4 other companies (p. 130). These troops are instructed in technical and scientific matters, and trained in railway management. For the latter purpose a short railway line (33 miles) is committed entirely to their care.

Another peculiar and significant organization is the "Aeronautic Detachment." At present it affiliates with the engineers and has charge of experimental ballooning. But the author quaintly remarks: "As soon as the problem of aerial navigation has

been satisfactorily solved, this detachment will, of course, greatly gain in strength" (p. 133).

We occasionally run across expressions in this article hard to understand, and which look very much like mistranslations, although the article pretends to have been written in English. For instance, in connection with the recruitment of technical troops, we read: "For technical organizations men are selected who are fit to work in the open air, and under unfavorable conditions" (p. 133). We had an idea that all soldiers ought to be able to do that.

The train battalions are still another important class of specialists. There are twenty-one of them, averaging three companies each (p. 133). Among other duties, train battalion men bake the bread in peace time, and man the field ovens in war. They also operate the transportation of the army, and when the army is mobilized, more of them are needed than the 21 battalions can supply. It is necessary therefore that there should be a large number of them in the reserves. For this reason a class of recruits is passed through the battalions every six months, so that in three years 42 battalions of instructed train men are passed into the reserves (p. 133).

The medical department seems to have an organization very much like our own. We refer to it merely to introduce the following statement: "The death rate of the German army in peace is smaller than that of any other standing army" (p. 137). This is no doubt due to the fact that the great bulk of the soldiers serve at home where they are thoroughly acclimated.

In the department of Military Justice we find one peculiarity which we cannot overlook. Courts-martial for the trial of privates consist of 3 officers, 1 non-commissioned officer and 1 private (p. 141). Verily the Republic might take a lesson in democracy from the Empire.

The drill and training of individuals and tactical units in the German army devolves upon the commander, and he is allowed every latitude as to time and the methods employed, being held responsible for the results. This is the very soul of military training and efficiency. To compel a company to go Fours Right and Fours Left after it has learned how to do it, until Recall blows, is simply to put it on the treadmill for that length of time. Instruction should never degenerate into punishment.

The regulations and customs which govern what we would call the enlisted men of the German army seem to be simple and sensible. There is nothing harsh or unjust in them and much that is wise and proper. Even the regulation which says "All persons in active service are prohibited from voting and participating in political agitation" (p. 157), is sensible enough, and ought to be copied in other countries.

We come to the end of Colonel Exner's article with regret.

General Lewal's article is a little beyond our depth. It is theatrical rather than military. Every chapter is a picture, a scene in a drama, a charade, a pantomime. It may have a military meaning but we are unable to grasp it. All that we can deduce from it is, that the French army is in excellent trim; that it is full of confidence; that it is worshipped by the people, especially the ladies; and that it will redeem the glory of France the moment it gets an opportunity.

The morale of the nation needed a little reconstruction, General Lewal says. It needed to be aroused by "heroic deeds." Victory was required "to make the patriotic fibre vibrate" (p. 169). And victory came. Not one, but many. Small specimens at first, but glorious and full of promise. The Algerian Insurrection; the war in Oranais; the battle of Oued Fendi; all glorious successes. The pacification of Tunis; the expedition to Tonkin; the occupation of Tametave; smiles of victory every one (p. 172). The army was certainly itself again—men, material and morale.

Then the "Paper Hunts" at home prove that our young officers can ride across country in a very dashing way—especially "when they feel that the eyes of the ladies are upon them" (p. 176) and experience no fatigue to speak of—nothing that would prevent them from tripping the "light fantastic" with the ladies aforesaid, on the closely-mown lawn near by.

But military life is not all dancing and paper hunts. Conscripts have to be drilled, and Sergeant Trévert is the man to do it; although we think him too much of a "cackler." But we may be mistaken. His oration to the awkward squad (p. 180) is patriotic and academic, but would not, in our judgment, be effective. Nothing like Corporal Casey's oration on a similar occasion, beginning: "There yez go agin, wi' a hump on yer back like a dog scrapin' a pot, etc."

Then we get a glimpse of the autumn manoeuvres, with the arrival of the recruits, and the foreign officers; and the balloon carts; and the carrier pigeons; and the gallant but reckless lieutenant who tried to sacrifice his life in stopping a runaway horse with a carriage full of people in tow, and failed (p. 206). After which, as a fitting climax at the end of the article, we are permitted to peep down upon a Pomeranian gentleman who has climbed to the summit of the Vosges mountains just to get a look at the French manoeuvres. And what does he see? Why, he sees or thinks he sees, red breeches climbing up the faces of perpendicular rocks in all directions, at which he is supremely disgusted (p. 213). Of course the Pomeranian gentleman may have been mistaken. He had a bottle of brandy with him, and his eyes may have deceived him. But he felt as he turned to leave, that there was no mistaking the "voices of the Alsaciennes" shouting at him, as a parting salutation: "*Vive France*" (p. 215).

The Russian army, as an army, is hardly described in the article under that caption. We have graphic descriptions of the Russian soldier and some account of the tribes from which he is drawn, but we are told very little about the methods of recruitment, instruction, equipment, administration and distribution of that enormous organization, the army itself.

Russian territory is divided into fifteen military districts, the commanders of which must necessarily have considerable independence. Indeed in all except the districts of Moscow and Wilna the military commander is also the governor-general of the district.

The regular army of Russia consists of 48 divisions of infantry, 113 regiments of cavalry; 477 field batteries and 42 battalions of fortress artillery, making 1,766,278 men.

The irregular army consists of Cossacks, Caucasian militia and Turkoman militia. Of course the Cossacks are by far the most important, mustering in war times 145,325 men. Most of these are mounted troops, the best guerrillas in the world. They are hardy, horses and men, and make invaluable scouts. In short they are really the eyes and ears of a Russian army.

The Caucasian militia, though less numerous—they number about 6330 men—are perhaps more warlike than the Cossacks (p. 248). They are warriors to "the very soul, sly, cruel and bloodthirsty" (p. 246). They are useful for outpost work, and can even execute charges on the battle-field.

The Turkoman militia number only 2000 men. They are a fine race, sympathetic, brave, hospitable, and honest enough among friends; but they will rob a stranger whenever they get the opportunity.

The Austro-Hungarian army is a large and admirably organized and equipped body of men. It is fairly homogeneous throughout in spite of diversity of race and the political duality of the empire. As commander in chief, the Emperor has power to declare war and conclude peace, and also to prescribe the discipline and instruction for



the army. Since 1866 the organization has been a copy of the German system. There is the same universal liability to serve, and the same three classes of service. Every subject of the empire, physically fit, is required to give 21 years military service to the state, either in the first class, that is the regular army, or in the *landwehr*, or *landsturm*. Although it is not stated in the article, it is believed that the classification of conscripts is determined by lot. If the lot assigns him to the *landsturm* he serves there for 21 years. If it takes him to the *landwehr* he serves in that organization for 12 years and then passes into the *landsturm* where he serves for 9 years. If his lot takes him into the regular army he serves 3 years with the colors, 7 years with the regular army reserve, 2 years in the *landwehr* and the remaining 9 years in the *landsturm*.

The physically unfit are not permitted to go scot free of all military duty. A tax known as "the military tax," is collected from all exempts, except the destitute, varying from one to one hundred gulden, according to their ability to pay. The money thus collected is devoted to the support of soldiers' widows and orphans (p. 268).

The Austrian staff differs from the Prussian in one important point—it is permanent; that is promotions in it are made from captain to chief and there is no returning to the line after a term of years.

The territory of the empire is divided into 15 military districts, each occupied by an army corps. But these corps are not intended to take the field as such. The mobilization for field service includes only selected and duly designated organizations. These are combined so as to constitute new corps, which, united in sufficient numbers, constitute the field army.

An Austrian corps consists of two, sometimes three, divisions of infantry, and a division of artillery (48 guns). The division consists of 14 or 15 battalions of infantry, 3 or 4 squadrons of cavalry and 24 guns; or otherwise expressed, 2 brigades of infantry, 1 brigade of artillery, and 1 battalion of cavalry.

But we have no space to devote to the details of Austrian army organization. Suffice it to say that Baron von Kuhn's article is very complete on these points and therefore valuable for purposes of reference.

The infantry is armed with an excellent repeating rifle (cal. 8 m. m.) and the soldier carries 100 cartridges upon his person.

Austrian cavalry have always been excellent. At present it contains 2600 officers and 69,200 men.

The artillery, as in Germany, is divided into two branches, field and fortress artillery. The field artillery is further subdivided into corps and divisional artillery, the batteries belonging to the latter class being denominated "Heavy Batteries." There are 14 regiments of corps artillery and 28 regiments of heavy batteries. The fortress artillery consisting of 6 regiments and 3 battalions occupy the fortresses.

The engineers, pioneers, railway and telegraph troops and train regiments are organized and instructed on the Prussian model. The "Sanitary Band" which is the Austrian name for the hospital corps consists of 400 officers and 21,200 men.

Great attention is paid to the instruction and training of officers. The schools for this purpose are excellent. The non-commissioned officers are instructed in their companies, and the instruction is said to be very good (p. 303).

So far as training goes, the Austrian army, according to Baron von Kuhn, compares favorably with any army in Europe.

Colonel Goiran, who writes the article on the Italian army, prefaces his description with a short but comprehensive sketch of the origin and development of the national military power of Italy. The germ from which the present organization grew, was the standing army kept by the Duke of Savoy. There seem to have been numerous standing armies maintained by the petty kingdoms and states of Italy, but most of



them consisted of foreign mercenaries which disappeared with the states which maintained them. But the Duke of Savoy's army consisted entirely of natives.

After the fall of Napoleon the Duke of Savoy, who had become king of Sardinia, reconstituted his little army and fought bravely in 1848 and 1859 for the liberation of Lombardy and Venetia from the yoke of Austria, and finally, in 1862, succeeded in establishing the kingdom of Italy.

The army of the newly constituted kingdom consisted of 80 regiments of infantry, 40 of Bersaglieri, 19 of cavalry and artillery and engineer troops in proportion (p. 315). In 1870 Rome was occupied and Italy ceased to be merely "a geographical expression." Its army, heretofore organized in divisions only, was now given a corps organization, and a second and third line was created which were known as the active and the local militia respectively.

The royal Italian army as at present organized, dates from 1887. The permanent army consists of 370 battalions of infantry, 144 squadrons of cavalry, 194 field batteries, 6 horse batteries, 9 mountain batteries, 69 companies garrison artillery, 64 engineer companies, and 40 supply companies.

Military service in Italy is compulsory. Every Italian, physically fit is bound to serve the state in some military capacity for 19 years. The conscripts are classified by lot. Those who draw first class go to the permanent army where they serve 3 years with the colors. After completing their service with the colors they pass into what might be called the reserve of the permanent army: as a matter of fact they are furloughed for 6 years, after which they join the active militia for 4 years, and then go into the local militia for 6 years, which completes their 19 years' service.

If they draw 2d class they serve 13 years in the active and 6 years in the local militia; and if they draw 3d class the whole 19 years are spent in the local militia.

As the present military system went into effect in 1887, two contingents have already gone from under the colors into the furloughed class, and six have been added to each of the lines of militia, all of whom can be called upon in case of need. Colonel Goiran gives a table (p. 253) showing in detail the number of men that Italy could call to her standard in an emergency, the grand total of which foots up 35,474 officers and 3,718,332 men.

Mexico, as our next door neighbor, ought to be interesting to every American. But she is not. Few Americans travel in that direction. Our trade with Mexico is limited. We are neither jealous nor afraid of her. And so Mexico rarely enters the American mind.

Still Mexico is a very interesting country we are told. The inhabitants are descendants of very warlike races, which persistently and savagely fought each other. To be sure they were easily subdued by a few Spanish adventurers shortly after the discovery of the country, but we are told, that was because the cunning Spaniard set tribe against tribe. In 1810-21 they showed the metal they were made of when they threw off the Spanish yoke.

But independence does not seem to have been altogether good for them. They have, in a measure at least, resumed their old habits, and fight each other with a ferocity which the writer says "gives the strongest proof of the personal bravery of the Mexican people." We should say that it gives the strongest proof of bad government.

The want of unity which prevailed among the Mexican people, we are told, made Scott's and Bazaine's march to the capital possible (p. 362). But all this is over now. No more marches of that kind can be accomplished. Unity has been established. The country is safe.

Of course it has taken time to accomplish all this. Mexico moves more slowly

than the United States. But the writer asks: "What might have come to the United States under a ruler less unselfish than Washington?" (p. 362) And, indeed, Mexico has been no worse than the other Spanish Republics, or even France. The road to liberty is almost always a rocky one. So says the writer in effect. And we concede his contention. And yet we are doubtful if even George Washington could have smoothed that road for the Mexicans. There is something rocky in the race.

Since the Mexicans have ceased fighting each other, they have set earnestly to work to construct a machine with which they may fight outsiders. They have a permanent army and a first and second reserve, respectable enough so far as numbers are concerned. There are forty thousand in all supposed to be with the colors. Twenty-six thousand of these are infantry, 8000 cavalry, and the remainder artillery, engineers and sanitary troops.

The artillery is not very well armed at present, we are told, but the government has a gun factory of its own, and is about to begin the manufacture of an "automatic breech-loader," whatsoever that may mean. So, in a short time, no doubt when the artillery gets that automatic gun, it will be efficient. The infantry are armed with Remingtons, but new guns, also home-made, are in contemplation for them.

The Mexican officers are said to be a very efficient body of men, 30 per cent. of them being graduates of the National Military College at Chapultepec, where the course is similar to that at West Point. There is an artillery school also at Chapultepec, where artillery officers have the benefit of a post graduate course, and altogether we must admit that so far as the schools will do it the Mexican officers who are graduates ought to be fairly well educated.

But the men in the ranks are admittedly bad. It has become a custom to draft criminals into the army. Judges sentence convicts to "service in the army" for so many years. We are told that President Diaz is trying to put a stop to this practice, but has to go slow. Established customs are not so easily rooted out. There are unhealthy posts to be garrisoned, and the writer says: "It is sound economy that prompts the formation of these garrisons of material that the country is better for losing" (p. 381). We might suggest hanging the criminals and abandoning the posts, but we have heard that hanging is the worst use a man can be put to. But we need not prosecute our investigation into the character of the men in the ranks any further. We have heard enough. Still it is amusing to hear the author say: "The men of the rank and file constitute a creditable body of troops." That they are capable of "capital fighting" and "not surpassed by any troops in the world" as marchers (p. 482).

The Mexican government evidently believes in setting a thief to catch a thief. The Plateados, a notorious band of highwaymen, have been appointed guardians of the highway; and the writer says the guard is very weak. Perhaps they can make more as guards than they could as robbers. How they would behave under strong temptations is not very difficult to guess.

"The Military Situation in Europe," the last article in the volume, is from the pen of Colonel Exner. It is simply a condensed statement of the military powers of European States. A review of such a mass of statistics would require an article to itself. We cannot therefore undertake it now.

JAMES CHESTER,  
Captain 3d Artillery.

## Cæsar.\*

There is, perhaps, in all history, no character, which is at once so completely the despair and the delight of both historian and reviewer as that of the celebrated man whose name affords the title of the work now presented to the public. Its phases are astonishing in their variety, but still more so in their completeness. It is like a well cut diamond whose many facets reflect a common source of light with equal brilliancy from whatever point it be viewed.

In the rapidly shifting scenes which represent the drama of this strangely compounded life we see the quiet, lounging "youth with the loose girdle," the dilettante priest of Jupiter, devoted to the study of oratory and *belles lettres*, yet all the while, under an affectation of foppery, watching with a shrewd eye the gathering clouds and listening to the distant mutterings of the coming storm which was to shatter to its foundation the ancient fabric of the constitution. Then comes the almost equally dilettante soldier making his first campaign with a careless nonchalance, not so much to seek glory abroad as to avoid danger at home, not so much to fit him for the work in which he later gained an immortal renown as to qualify himself for the civil preferment which was the one object of his ambition. Yet a little while and in rapid succession passes before us, the orator hurling his invective against the aristocratic favorite of the Senate and the plunderer of Macedonia, denouncing the authors and perpetrators of the abuses and corruptions which made the administration of the Republic's affairs at home and abroad a synonym of infamy,—in terms so energetic, in diction so pure, in logic so convincing, as to extort the admiration of Cicero himself; the shrewd, resourceful and courageous politician, watching the debates of the Senate and controlling the votes of the Comitia; the general, defending the walls of Rome in the gloomy wilds of Gallic and German forests and by the uttermost shores of the known world; the broad-minded, far-seeing statesman, and lastly, the reformer, creating and reviving laws which, but for the senseless crime of the Senate chamber, might have postponed for a time the inevitable end and given for some generations a new lease of life to the dying Republic.

In striking contrast with other great men of antiquity, history has preserved for us most of these various phases of Cæsar's life and character so completely, while each of them, with reference to the political problems of the last century and a half of the old era,—to us, the citizens of the new Great Republic, the most instructive of all recorded in the history of the world,—affords a subject for such profound study, that it is not strange that historians generally have failed to coalesce them into one man, but have given us as many Cæsars as there are sides to his character. The Montagnards and the Girondins of the French Revolution vied with each other in extravagant eulogies of Brutus and Cassius as the deified avengers of their country's liberties, while in the blood that dripped from the guillotine mothers baptized their sons anew in the name of these saints of the Carmagnole; and later both Republicans and Royalists took a gloomy pleasure in attributing the crimes of Napoleon to the influence and example of Cæsar. On the other hand, in a scene replete with horrors, the author of the *Divina Comedia* represents to us Satan in the nethermost pit of hell crunching in his triple jaws Judas Iscariot, Brutus and Cassius, the three archetypes of loathsome traitors,—nor does he paint in blacker colors him who betrayed his master and his Lord with a kiss than he uses for those who stabbed their friend in the back. Between these views comes the Encyclopædist who tells us that Cæsar's "greatness has not been over-

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rated," that "the more we contemplate his position and his work, the less opportunity we shall find for blame and criticism," and that "the dignity, sweetness and nobleness of his character cannot be concealed." Fading off from this to the two extremes is every variety of views from the one which represents Cæsar as a military tyrant, deliberately plotting his country's ruin, to the one which exalts him as the temporary savior of its liberties and glory.

A recent most beautiful scientific experiment has demonstrated, by using the eyes of certain insects as the lens of a camera, that while each of their many thousand lenses gives a separate image of the object, these are all so superimposed upon the retina as to form a single image, in which the various imperfections of each are blended and disappear in one perfect whole. By some similar mental process a future historian must give us, if we are ever to have it, a life of the great Dictator, in which the many views of his character, each correct as far as it goes and each wrong because incomplete, shall fade away into the perfect similitude of the man and through the mists of party faction and civil strife we see the actual personality of him to whom his contemporaries gave divine honors as a demigod and whom our author, in common with many others, calls the "greatest man in antiquity."

Colonel Dodge disclaims any purpose of presenting this complex character to us other than as a "Great Captain,"—tactician and strategist. This the limits of his space rendered necessary. But it is none the less unfortunate because necessary. Here, indeed is the one defect, unavoidable it is true, of a series of works like that of which the present one forms a part. A series of Great Mathematicians, of Great Painters, of Great Musicians, may be written, in which each volume will exhibit the character of its subject, complete with reference to the controlling idea of the entire work. The study of such characters should not be complicated with other issues because we instinctively feel that such issues had, as a rule, little or no direct influence upon them. We may read the *Principia* with delight and bestow not one thought upon the great revolution with which the very air was heavy as Newton wrote, but the influence of which never penetrated the retirement of his library. Except as affording him the motive of a celebrated symphony, the next and greater revolution passed unnoticed by the gloomy but overpowering genius of Beethoven. The sublime creations of Raphael and Michael Angelo received, so far as we can trace, no impulse and suffered no hindrance, from the tremendous convulsion that in their day was upheaving the religious and political world. Nor is the reason far to seek. Success on these and all similar lines of action requires a mind which feeds upon and lives within itself, which possesses in the highest degree the singular power of abstraction that enables it to shut out all external influences and contemplate the images of its own creation. Everything which interrupts this process of introspection, which breaks in upon this condition of mental isolation with the rude facts of the every-day world, is no help but a hindrance. A great mathematician is annoyed by the ceaseless tramp of Napoleon's soldiers in the street, and in high dudgeon that the conqueror of Europe should so confuse his ideas on the theory of fluxions, he retreats to a little hamlet by an Italian lake and there completes his immortal work; a great composer closes his piano because its harmonies are made harsh by the thunder of the guns at Jena, because the deep diapason which rolls in at his windows from the conflict that is about to consummate his country's ruin interferes with a thrilling melody of his half finished opera. Such is the uttermost influence which the most momentous events have upon minds engaged in philosophical and meditative pursuits.

But with great generals who, more than all others, are men of action, and more especially with the great generals of antiquity, who united within themselves all or many of the functions of the State, it is impossible, without prejudice, to divorce the

soldier from the other characters that make up the man. Of Hannibal, perhaps, this is not true, for we know little of him except as a soldier. Of Alexander it is only partially true, because the character of his mind was such as to make everything subservient to his military ambition and while he had the opportunity to distinguish himself as a ruler, a legislator, a reformer, he preferred the ruder glory of a conqueror. But of Cæsar it is completely true. In him the thing which most strikes us is the absolute equilibrium of his mental constitution. Had some of the qualities of his mind been stunted, the others might have been forced into an even more vigorous and marvellous growth, but resulting, perhaps, in the half mad freaks of another Alexander or in the life of gloomy revenge of another Hannibal. Everywhere we see the limitations which each part of his many sided genius sets to the abnormal development of the other parts. It is this wonderful equipoise of character which entitles him, not so much to the name of great general, great statesman, great legislator, though he is entitled to them all, as to that which is universally given him,—a great man, and which justifies the instinctive perception of the first of all dramatists when he calls him "the foremost man of all this world."

The qualities of a general must be judged by the difficulties of the problem, always various and always complicated, which he more or less successfully solves. The most serious of these difficulties may not lie in front of him. The problem is always at least as much political, financial and social, as military. Behind him may be a lukewarm, a jealous, even a hostile state, though his own, and every step he takes must be with a side glance to the events at home. Here Alexander possessed a great advantage. When he left Macedonia he carried the State with him; his headquarters was his capital. Hannibal, though for 17 years he waged war without help from Africa, had the inestimable advantage of being untrammelled in victory or defeat; he was as independent of home control as a Captain of Condottiere in the middle ages or Elizabeth's free-booters in the Spanish Main. Not so with Cæsar; behind him was suspicion, secret jealousy ripening into open hatred. A single defeat meant irretrievable ruin. Whether we regard him as a man inspired by motives of the purest patriotism or of the most transparent ambition, all his hopes were involved in the chance of each successive battle. The German king backed by a quarter of a million of warriors to whom death was but the welcome entrance to the eternal drunkenness of Walhalla, tells him insolently to his face that he has it direct from Rome that Cæsar's head is the most acceptable gift which he can make to the Republic.

All this must be borne in mind when at one moment we are tempted to say that Cæsar was too rash and at another that he was over prudent. And this is what was meant in saying that in judging Cæsar's capacity as a soldier we must take into consideration not only the other phases of his character but also the political and social condition of the times in which he lived. One might otherwise as well attempt to paint the hues of a sunset with a single primary color of the spectrum. And despite his avowed intention, our author has felt himself obliged to touch, partially, indeed, and incompletely, upon some of these conditions. In one of the latter chapters of his work he gives us his estimate of Cæsar, not merely as a general, but as a man, without having given us the data necessary to verify all his conclusions. He occasionally indulges in reflections in regard to points of Cæsar's character, which, considering that men have disputed about them through all the centuries from Cicero to Froude, would require the argument of several chapters to justify.

But he is not to be held responsible because the limits of his space could not extend to two volumes instead of one. The student, however, will feel a momentary regret at this application of the Procrustean method to history, by which Cæsar, who, directly and indirectly exerted an influence for good and bad extending to our own

time, affecting our language, our laws and our religion, is made to fit the same space as Alexander and Hannibal whose brilliant achievements have left no more trace than a blazing meteor and whose influence on the world's affairs has been as evanescent and futile as the evening breeze of a by-gone summer.

Nevertheless the military student owes a debt of gratitude to Colonel Dodge. He has succeeded as well as it is possible to do, in separating Cæsar the soldier from all the other Cæsars. He has read and collated what is valuable in the observations of preceding military critics. To this he has added the value of his own criticism which is in the main just and helpful. It is pleasant to note his gratitude for the services of Colonel Stoffel whose contribution to our knowledge of military antiquity, the result of labors undertaken by direction of Napoleon III. to assist that Imperial author in his life of Cæsar, is unquestionably the most important ever made. Occasionally the student may see reason to doubt whether the author's departure from so safe a guide is altogether wise. Colonel Dodge claims an advantage for his maps over the costly and elaborately detailed ones of Stoffel. In this he is, to a certain extent, right but it is to be regretted that he did not omit the very "scratchy" topography of some of them which conveys no adequate notion of either tactical or strategical conditions. In most cases that involve difficulty it is the very question of topography that is in dispute. In such if it be the author's intention to maintain certain tactical views as against others it would be better either to give very carefully the topography which meets his case or else trust to the force of his argument with the aid of a simple outline map.

In his opening chapter the author rapidly and clearly sketches the changes in the art of war,—changes which in important respects he considers deteriorations,—during the 144 years that had elapsed from the close of the Hannibalian wars to the beginning of Cæsar's first campaign. The tactics, recruitment and organization of the legion had changed. The arms generally remained the same as those of Scipio's men at Zama; the tactics were as different as were the tactics of Austerlitz from those of Fontenoy. Great advances had been made in ballistic arms and the art of fortification. As a result sieges were undertaken and skillfully carried out on a scale hitherto unknown.

Rome was already far advanced upon her career of world conquest. Powerful fleets were therefore necessary to carry her arms into the most distant seas; to overawe the pirates that preyed upon her commerce in the Mediterranean, now a Roman lake; to protect her outlying colonies, and to serve as a base of operations against still more remote nations whose chiefs had not yet graced a Roman triumph. So there grew up a navy in general organization fashioned very much like a modern one. There were its light cruisers for the less dangerous service; its scout boats and a sort of gunboat; vessels specially designed for use on rivers and shallow estuaries; its armored line of battle-ships and rams. For these there were regular orders of battle, formed at the proper signal from the admiral's mast-head. Arsenal, dock-yards and fortified harbors of refuge were constructed and the government took possession of the timber lands suitable for the needs of its fleets.

It was with an army thus recruited and organized, accustomed to the more important of these tactical changes, imbued with this newly awakened military spirit,—as distinguished from the mere martial spirit of former times—that Marius undertook the memorable campaign against the Cimbri and Teutones and by the victories of Aquæ Sextiæ and Vercellæ lifted a little the dread that had weighed like a nightmare upon Roman hearts since the day of Brennus but which was never entirely dissipated until Cæsar's conquests enabled Cicero to declare before the Senate: "The mountain barrier alone has enabled Rome to grow to its present greatness, but the Alps may now sink into the earth! Italy has no more to fear."



It is therefore the more difficult to follow the author to his conclusion that this army, the one created by the reforms of Marius and which descended to Cæsar, was "no longer representative of Roman courage, honesty and patriotism," and that in the legionary soldier of these latter days was seen "the loss of the old Roman patriotism, discipline and staunchness." The principle underlying these changes is of vastly more importance than any mere change in tactics. It is the principle which led Washington to cry out in despair for a force of "regulars" to replace the militia of the Continental army. It is the principle which leads every thoughtful soldier in our own day to advocate the maintenance of a reasonable force of professional soldiers, "mercenaries" if you please, and as the argument of the author is the very same as that daily employed by legislators hostile to this principle there needs no apology for considering it at some length.

Military criticism has usually found its most fruitful subjects in the times of great national epochs, for in a world the history of whose progress has hitherto been the history of war, these epochs have been characterized by great military undertakings. Such periods are marked by internal revolutions or by tremendous international collisions in which one system of principles and institutions—generally the more ancient and less worthy of survival—is defended by the military system which grew up with it, while against it are arrayed the newer and better political ideas backed by a better military system. In the crash which follows the old system is wrecked; the new remains triumphant until it also is forced by the law of progress to renew the hopeless struggle with a younger and stronger rival. There is no necessary, not even a probable, inference of deterioration in the beaten system from the fact of its downfall. It may be and often is in the fullness of its perfection at the fatal period. It is beaten, not because it is not so good as at some former time, but simply because it has reached the limit of development of which its nature is capable, and it goes down before a system whose principle permits the attainment of a degree of perfection which the other could never reach.

It is well to study each of these systems, which for a time stood the test and were then discarded, in order to see the limits which were imposed upon each by the nature of its underlying principle and understand why each succeeding one attained a point which its predecessor in its best days never reached. Unfortunately most military critics attempt to go much further than this. Because the decay of a political system is generally traceable to some process of corruption, they waste much time in seeking the evidences of deterioration which, they think, must precede the downfall of a military system. They plod through the whole history of a people in order to trace the gradual loss of the rugged virtues that characterized its earlier days, as though this gave the key necessary to explain Zama and Pharsalia, Leuthen and Jena. They forget that a political system is a body which like an animal body increases in strength to a certain point and then dies because of some disease engendered within itself; while a military system is a machine which is developed to its limit and is then thrown aside, not necessarily because of any decay or weakness in its parts, but because some one has invented a better machine. The two systems may, it is true, live and fall together, but the connection is as liable to be accidental as to be inherent. Rome, in the days of her purest virtue suffered the most appalling defeats; she was rotten with corruption during the period of her greatest military triumphs. This tendency of the critics has given us many interesting moral and philosophical reflections, but much false history. They tell us, many of them, that Auerstadt and Jena were due to a decay of the old Prussian spirit, to the substitution of mere formalism for Frederick's methods. But formalism was the very essence of Frederick's methods. The great King never commanded an army so perfect, judged by his own standard, as that



which went down before the onset of Napoleon on that fatal day. Yet there are men who think that history would have been written differently had Frederick and "Der Alte Dessauer" been in the place of Hohenlohe and Brunswick. As well expect an old three-decker commanded by Nelson, to snatch victory from a modern cruiser. Frederick's system was beaten because, while at its best, it was inferior to the Republican system of Carnot perfected by Napoleon.

It is, of course, not intended to assert, that ultimately deterioration in a nation's character and morale will not be reflected in its military organization. When the qualities of the iron and steel supplied for its construction become defective the machine is defective no matter how sound may be the principle on which it is built. It is only meant that the great changes in military organization and tactics which have periodically occurred in every nation almost never, in spite of frequent assertions to the contrary, indicate any deterioration in "patriotism, discipline and staunchness." That this was true of the reforms of Marius it is believed that history unquestionably proves. Nor is this to be controverted because at a later period the legions degenerated into the militia from which Marius had evolved them and under a succession of weak and profligate emperors they "sold the empire which they were incapable of defending, and ultimately became an easy prey to the rude and daring barbarians of the North."

Before Marius the organization of the legionary armies was based upon the law attributed by legend to Servius Tullius. The system was distinctively a bad one and every change effected by Marius was a noteworthy reform. The old principle of recruitment was service based on property qualification. Every five years a census was ordered and the population was divided into six classes, according to individual wealth. The sixth class, the poorest, was exempted; from the remaining five were enrolled for service all the able-bodied men between the ages of seventeen and forty-five. The first four classes provided the legionary infantry; *triarii*, *principes*, and *hastati*, while from the fifth class came the light troops,—*velites*. These men furnished their own equipments and served without pay, while a certain number of patricians and citizens of wealth, who formed the cavalry of the legion, provided also horses and armor at their own cost.

The legions were organized anew each year. Immediately after their election the consuls proclaimed the day for enrollment and appointed the military tribunes for each legion to be formed. On that day the magistrates selected by lot a certain number of citizens from each of the first five classes. These appeared before the Tribunes who selected, each for his own legion, the number needed to fill its ranks.

On the annual muster day, subsequent to the enrollment, the legion was organized. Each man was assigned to his place in the ranks, not according to his fitness, but mainly according to his wealth. The young men if they were also the poorest, formed the *velites*; the old men, if they were the richest, formed the *triarii*. Fitness was a qualification *sine quâ non*, only in the case of the *principes*, who being heavily armed, required the strongest men. The subordinate officers took their rank from the class to which they belonged, a centurion of *triarii* ranking above one of *hastati* or *principes*. The three classes which formed the line of battle and reserve were then each divided into ten *manipuli*, and the cavalry into ten *turmae*, the *velites* being distributed among the thirty *manipuli* or infantry companies,—generally with the *triarii*. This legion was formed for battle in three lines at distances of 250 feet with company intervals in each line.

Two or more such legions were commanded by a consul who often enough had no real military training. Marius declared that he himself knew consuls who, until after

their election, had never studied the art of war; "homines præposterī" is his contemptuous summary.

It is evident that such a system of recruitment was never adapted for sustained military operations. It could have originated only in a state whose most remote expedition was a sudden predatory raid into a neighboring territory, after which the citizen soldiers returned to the plough and the loom until compelled to take up arms again in order to repel an equally hasty incursion from without. The Romans very early perceived its defects. A slow process of change began, dating even from Servius himself and culminating with Marius.

The practice of disqualifying a large body of freeborn citizens from the military service of the State on account of their poverty was essentially a great evil. The spirit in which it originated and which it in turn fostered was the poisoned source of all the corrupting influences which first debauched and then destroyed the Republic. It did not indicate superior patriotism on the part of the wealthier classes. Though these classes served without pay they were none the less mercenaries. They fought for the possession of land and when acquired they quarrelled over the division of the spoil. The first effect was to condemn the poor classes to hopeless poverty and subjection. Only by becoming land holders could they amount to anything in the State. But land was the spoil of the sword and spear and to bear these they were forbidden. The second effect was that through the natural absorption of the lion's share of successive conquests by the patrician class the middle classes of freeholders were gradually driven to the wall, so that by the time of Marius a large body of the yeomanry upon whom the vitality of the State depended were actually reduced to a condition under the law, of disqualification for military service. Thus on the one hand, there was a small patrician class rich beyond the dreams of avarice and corrupt with every vice, evading all military service, and on the other, a large body of the citizens who still retained much of the old virtue but who under a strict interpretation of the law were debarred from bearing arms. Marius solved this difficulty by the simple process of giving every freeborn citizen the right to serve. It was from these freeborn citizens that the legions of Cæsar were afterwards raised, and whose character was such as to justify Froude's assertion that in their ranks was found pretty much all that had survived of the old Roman patriotism and virtue.

Another reform had been effected prior to the time of Marius. The place of a man in the ranks and the arms with which he fought were no longer determined by the senseless test of the length of his rent-roll. Each soldier took the place for which he was best fitted, generally and naturally determined by the length of his service.

Of the tactical changes the most important was one that Marius must have congratulated himself upon at Aquæ Sextiæ and Vercellæ, and indeed, its necessity was probably first made apparent to the Romans in their conflicts with the vast hordes of undisciplined, but courageous barbarians. During the Hannibalian wars they had an opponent who was a master of skillful and rapid movements and combinations. These struggles evolved the battle formation of the legion above mentioned,—three lines of company columns. It was easily and rapidly manœuvred and presumably was adapted to meet the tactics of the enemy, though the frequent defeats of the Romans may leave us in some doubt on this point. At any rate, it was ill-suited to repel the onset of wild barbarians who would have poured through its many intervals like water through a sieve. We know the anxiety which Cæsar so often expressed in regard to the "latus apertum," and whether this exposed side was an unsupported flank—a flank *en l'air*—or was simply the side unprotected by the shield, the old formation would have greatly increased his fears. He wanted a formation dense enough to stop the enemy—if they were not so strong as to overturn it bodily—and which permitted the counter-attack with

the maximum number of men in line. So he, and Marius before him, set up the legion in lines of cohorts instead of lines of maniples, thereby reducing the intervals to one-third their former number.

Such was the legion of Marius and Cæsar. It exhibited no lack of the old staunchness. On one occasion, in the African War, we find Cæsar testifying his confidence in the steadiness of his troops by forming the legion in a single line of cohorts, without supports or reserves. The organization of Marius contemplated that every legionary should be a freeborn Roman citizen. But in the Social War emergencies arose to which the law had to curtesy and even slaves and criminals were enrolled. Under Cæsar the legionaries were always citizens until the exhaustion of both parties during the final struggles of the Civil War obliged them to seek new sources for recruits. Even then the Roman legions were never contaminated by the presence of foreigners. The latter served in separate organizations. Cæsar once raised a Gallic legion at his own charge, a fact which, it has been conjectured, indicates that it was unlawful to subject the State to expense for such a purpose. Even then this legion was prohibited from bearing the Roman eagle and when disbanded citizenship was conferred upon its soldiers. On the famous occasion when Cæsar quelled a mutiny of his troops by a speech, he addressed them as "Quirites." Colonel Dodge thinks this word was used as a term for contempt; which "shamed" the mutineers into obedience; that it was a "title which every Roman soldier in the early days viewed with pride," but that these men regarded as a reproach since "they were not citizens, nor did they care to be." On the contrary, nothing can be more certain than that these men were citizens. Cæsar called them Quirites precisely because they were citizens. The name Quirites was the official name of the Sabines and after the union of the latter with the Romans in one commonwealth it was joined with that of Romani, the technical designation of the nation becoming "Populus Romanus Quiretium." But the term Quirites was employed by the Romans when they spoke of themselves in their civil capacity, while they used the name Romani to denote their political and military capacity. When the legionaries mutinied and demanded their discharge rather than go upon the African expedition, Cæsar told them that they were discharged from that moment and could go to their homes. In this totally unexpected reply he emphasized his meaning by addressing them in the name which denoted the civil condition to which he relegated them and which then properly belonged to them.

The changes in the military institutions of Rome were those which mark the transition from a militia system to a regular standing army. War had now become the trade of a separate class of society. The Roman influence and power could no longer be maintained by annual levies composed of men to whom the making of a campaign was an abnormal incident of their lives. The new political condition had come about during the time that had elapsed since the long struggle with Hannibal and precisely during that time the Romans discarded the militia for a permanent system. It might, perhaps, have been better for them could they have made the change before instead of after Hannibal's time. It is difficult not to believe that we should then have had a different account of the Punic Wars. The best that can be said of the old system is that, at a lavish sacrifice of life, it saved, not from shame and disgrace but from annihilation, the Republic which had well-nigh sunk under the titanic blows of the African General. When the development of a Nation brings it face to face with the necessity for this change it has only two courses from which to choose. It may have a permanent military system based on conscription or universal obligation to military service, or it may adopt the method based on the voluntary enlistment of men who serve for pay. As England, as the United States, as every nation in which are combined the two conditions of great or scattered possessions to defend, with an intense longing for the

utmost individual liberty, so Rome chose the latter course. This is not the place to discuss the relative merits of the two systems. Certainly either of them is better than the militia system which Rome abandoned, although Colonel Dodge's presentation of the case might confuse the ideas of some legislators upon a point in regard to which they stand in need of enlightenment.

To the general reader the only unsatisfactory part of Colonel Dodge's work is that which covers the time during which was evolved the political condition which in the final struggle forced Cæsar to take one side and Pompey the other. To discuss this was avowedly no part of the author's design. Yet the absence of such a study is felt when we come to the presentation of Cæsar's character. Like all great statesmen-generals who appear at certain crises in history, Cæsar was a child of fate. In him were concentrated all the political ideas which came as the inheritance of generations to the class in which he was born. He had imbibed them with his mother's milk. They were a part of his inherited mental constitution and he could no more change them than he could change the color of his eyes or the shape of his features. This had a noticeable influence on his military career. Had he died in youth history would have been written differently as regards some few campaigns. But the fate of the Republic would have been the same. For her there were ten thousand Cæsars bred of her iniquities and corruptions. While he lived he could have acted differently from what he did only by some impossible act of mental suicide. A profound study of the man and the conditions that made him is as necessary to understand Cæsar the general as it is to understand Napoleon.

After a discussion of the reforms of Marius the author passes rapidly over the period between the years 90 and 60 B. C., giving us an accurate estimate of the military capacity of Sulla and Pompey. In one chapter we have the story of the first forty-two years of Cæsar's life. In the account of his first service in the East where he acted as aide-de-camp in the campaign against Mithridates, some currency is given to the idle stories of Suetonius and other scandal mongers of antiquity, in regard to Cæsar's immorality. After an account of his gradual rise in civil preferment we find him with the rank of prætor, Farther Spain being assigned to him as his province. A brilliant campaign, of which history has preserved little record, added much territory to the Roman dominions, and was rewarded with the offer of a triumph which he declined.

In speaking of this period the author regrets that we do not know how Cæsar learned what he knew of the art of war before his Gallic campaigns. But as a matter of fact the great generals of the world seem to have owed very little to previous military training. Hannibal it is true was, from his youth, brought up in the camp. But Alexander was a successful general at eighteen, in his first campaign. Cæsar lived through the prime of his life in civil office, yet the moment he comes into command of troops his transcendent military genius blazes out with the suddenness of a newly created star. Neither the training at Brienne, nor the subsequent wearisome round of artillery garrison service, nor the siege of Toulon can explain the wonderful Italian campaigns. Napoleon was a general commanding armies with an unrivalled genius for war when he could not give the commands for manœuvring a battalion. It is seldom indeed that a first-rate subordinate commander is found except it be one who has learned the technique of his art by long training, and much bitter experience. But the great masters, who, finding this material formed to their hand, mould it into the marvellous combinations that excite our never ending admiration, cannot have their skill accounted for as the result of their previous experience. The truth seems to be that strategy—the distinctive art of the general—has never been learned by any general from his own experience. And it may be doubtful whether he learned much from

the experience of others except in so far as his study of this subject roused into activity some dormant faculty, which only rare minds possess, and which, once aroused, becomes the all controlling power of his intellect. This,—confessing the poverty both of their knowledge and of language,—men are generally content to call genius.

Having completed his term in the Consulship, during which he enacted many laws which made the life of a Roman citizen of the middle and lower classes more tolerable, and secured many reforms which diminished the power of the Oligarchy, Cæsar, at the instance of the popular tribune, was invested with the proconsulship of Cisalpine Gaul. As a proconsular government was one, which, by its definition was supposed to be administered by military force, he received the command of four legions, and much against the wish of the Senate, his term was made five years.

This much having been unwillingly granted, the nobles surprised the commons by increasing his command, unsolicited, with the addition of Transalpine Gaul. Our author thinks that this was done "under the pressure of danger." But the danger existed when the Senate was resisting by every means Cæsar's appointment of proconsul of Northern Italy. The nobles would have been only too glad had they dared, to assign one of their own number to the command of Gaul, as an offset to Cæsar. To thus divide the command would, moreover, have been in accord with the traditional Roman policy. It seems more likely that the action of the Senate was one of those frequent cases of irrational vacillation where, after irritating the people to the verge of madness and revolution, the patricians suddenly yielded all and more than had been demanded. Their first enforced yielding was a dangerous victory for the people; they sought to placate them with a gracious gift. Having lost the hide they flung the horns and hoofs after it.

For the better part of the next ten years the author follows the text of the Commentaries, our only guide through these wonderful campaigns. In his account of the characteristics of the Gauls into whose country Cæsar was about to march, Colonel Dodge, in common with a number of writers, says that these people "wrote with Greek letters." This assertion is based on isolated passages in the Commentaries, but these passages are inconsistent with each other, and the statement, as part of a general description, is almost certainly incorrect. It is, of course, of no consequence in a military discussion but since the author thought it well to make the statement, it may receive a passing notice.

Cæsar, in his Commentaries, makes three references to the use of Greek letters. The first instance is this: Cæsar relates that the Helvetians, prior to their outbreak, had made a careful census of their population. After their disastrous defeat, he finds in the abandoned camp tables in which the results of the census are set down ("*tabulæ literis Græcis confectæ*"). The second is on the occasion of the siege of Cicero's camp, when the garrison is in dire distress. Cæsar sends him a letter of which he says "*hanc [epistolam] Græcis conscriptam literis*," etc., adding that it was with the object of not being understood by the enemy if it fell into their hands. The third instance is in the fourteenth chapter of the sixth book, where, speaking of the Druids, he says, "*Græcis utantur literis*."

The Greeks had been on the Mediterranean coast of France for 600 years prior to the Christian era. But they were there, not as teachers, but as traders. We have abundant experience to show that mere traders do very little in the way of communicating their language to the natives with whom they deal. And it is well to bear in mind that the natives with whom the Greeks dealt were nearly or quite as barbarous as any Sioux that have roamed our western plains. The trader picks up enough of the native dialect to make sure that he will be the cheating and not the cheated party. On his side the native acquires a little of the stranger's tongue and hence springs up that curious *lingua*

*franca* which for a time marks the track of those who abide among savage peoples for gain. In time, some of the natives, among whom was never before a written word, learn to keep rude accounts using naturally some modified form of the alphabet of the stranger's language. But neither this written or spoken language becomes general, more especially when the traders come in contact with only the outskirts of the native people. This would explain why the two or three inscriptions, alleged to be in a Gallic dialect and referred to by Mommsen, were all found on or near the site of an old Greek trading colony. There is no instance in history of the introduction of a written language, such as in the case of Gaul, except at the hands of the missionary or the conqueror; and the Greeks of Massilia were neither. The priests of Constantinople carried the Greek alphabet to the Slavonic peoples that dwelt beyond the Dniester and thus we have the written Russian of to-day; while at this moment Christian missionaries are carrying the Roman alphabet to hundreds of savage nations. And it was the conqueror, followed by the missionary, who first carried a written alphabet that attained any vogue into Gaul. As the result of their 550 years in that country before the arrival of Cæsar, the Greek influence, so far as it can be traced, was absolutely *nil*; within one hundred years after his conquest Gaul was well-nigh Romanized.

Thus, it would only require the presence among the Helvetians of some Greek renegade or some native hanger on about a trading station, to explain the tables in Greek characters which Cæsar found. And we thereby avoid doing violence to every probability by assuming a general knowledge of this or any other written alphabet among the Gauls.

This conclusion is confirmed by Cæsar's second reference, in connection with the message sent by a scout, through the besieger's lines, into Cicero's camp. This he says he wrote in "Greek letters" for the very purpose of being unintelligible to any one in that great horde if it fell into the enemy's hands. How could that be if the Gauls generally knew the Greek alphabet? It is proof positive that they had no such knowledge. What then did Cæsar write to Cicero? Gallic embassies had frequently made prolonged visits to Rome and here and there were men who had received some education in that city. It was by no means improbable that a message in Latin would have been deciphered. And, as shown above, a Latin message in Greek characters might be read, though that would not be so probable. But it would have been absolutely safe to write in the Greek language and that doubtless is what Cæsar did.\* No one now claims that the Gauls had any acquaintance with that language. And in this connection we have a curious bit of information in reference to these very two men. Greek was the French of Cæsar's time. It was more than that. To the cultivated Roman it was what the French was to Frederick the Great,—the language in which he frequently thought and wrote and talked, out of mere ostentatious vanity. That Cæsar was as well skilled in it as in his own tongue we know from many sources. As for Cicero, we have a letter bearing on this very point. The Cicero who was Cæsar's lieutenant-general was the brother of the great Tully. In one of the letters written by the latter to his brother during one of the Gallic campaigns he says that he has sent some Greek poetry to Cæsar for the benefit of his criticism. He asks him to discuss the poetry with Cæsar and to write to him what the latter really thinks, evidently believing that his brother's critical knowledge of the language is quite up to the task.

We can explain the reference in the sixth book of the Commentaries to the use of Greek characters only by the frequently observed fact that Cæsar was fond of painting his word pictures with few strokes. A few isolated facts are frequently grouped

\*That "literæ" means "language" as well as "letters" is shown by many passages. Thus Livy VI. i. "parvæ et raræ per eadem tempora literæ fuere."



together to form a general description of several millions of people scattered over a great territory much of which he had not visited and divided into many nations, which, as he himself says, differed among themselves in language, customs and religion.

Cæsar's account of the Helvetian Campaign is especially interesting as giving us a clear notion of the method followed by ancient peoples in executing those great movements of translation which sometimes puzzle the historian. To solve the difficulty he often assumes great exaggeration on the part of ancient writers, which is doubtless correct. But without such light as the Commentaries give us we may divide these numbers by two, and by two, and again by two, and the difficulty remains as great as before. To move one hundred thousand men through the sparsely settled wilderness of Europe, subsisting on game and plunder would have been practically as impossible as to move a million. Cæsar's story indicates that a warlike nation, anxious for a more fertile territory, looked about for such a one, lying not far away and whose people were weak enough to invite attack. Then the chiefs made preparations as systematic as those of some modern general staff for a national mobilization. In this particular case a census is taken. The chiefs assemble and discuss the relative advantages of their neighbor's possessions. By a vote they decide which portion they shall plunder and annihilate. For two years they sow grain with a view to having enough to carry them through the campaign and until they can reap in their new fields. Then, after this period of deliberate preparation, they assemble the entire people at the place of meeting, and, everything that cannot be taken in their supply train being destroyed, they march out, leaving their own territory a waste behind them, to reduce that of their neighbor to an equal desolation. The subsequent accounts show that the Germans also migrated in this same methodical fashion. If there was no resistance or the enemy weak, the impulse of the movement carried it a long way. Otherwise they stopped on the first likely bit of ground and perhaps generations elapsed before the all-consuming earth hunger urged them on again.

To check the movement of the Helvetians Cæsar crossed the mountains to the westward and then moved north towards Geneva. While going through the form of negotiation in order to gain time, he constructed a line of defense and of obstacles on the left bank of the Rhone. The interpretation of the passage in which he describes this work has been a subject for much discussion. Cæsar says that he built a parapet sixteen feet high, with a ditch,—the whole extending for a distance of about eighteen miles. Colonel Dodge says that the assumption that the *murus fossaque* was a continuous line is untenable. That the proposition cannot be stated as strongly as he does, an examination will show.

Cæsar's statement on the matter is perfectly clear. If there is any doubt as to the fact stated, it need not be because of any obscurity in the passage to be translated; it must be because he deliberately misstated it, or because some blundering transcriber has done so for him. The verb employed to indicate the construction of the parapet and ditch is one which denotes an unbroken continuity. It is the one used by classic writers to describe the introduction of water through a long aqueduct into a city, or the march of an army when it is intended to convey the idea of rapid movement by obliterating even the suggestion of a halt between the initial point and the objective. Its first derivative meaning in Cæsar's own time and long before was "to prolong," "to continue." Wherever he wishes to speak of several detached works—as he does in this very passage—he uses a plural noun. But in reference to the wall and ditch he uses a singular noun and a verb indicating unbroken prolongation. Moreover, in the very next sentence he says that "when that work [the wall and ditch] was completed," he proceeded to construct a number of redoubts, indicating that the redoubts were subsequently added for additional strength.



Cæsar's statement being so clear it is only fair to assume that it is correct if it is not unreasonable. That it is not unreasonable a few facts will show.

It is admitted that the magnitude of the work involved no difficulty. With the men available it could easily be constructed in a small part of the time at Cæsar's disposition. The work being possible, that fact alone, under the circumstances, makes it probable. Cæsar says that he constructed the work as an obstacle. To be effective the obstacle had to be continuous. At every point it had to be strong enough with a few defenders to hold the enemy until reinforcements could come up. If he had concentrated his troops at the five fords and the enemy broke through between, he was lost. He made no pretense of being able to fight them in the open field (X) nor did the enemy confine themselves to the fords. They made a bridge of boats and many rafts. After they got over the nature of the ground made little difference to them unless it was an unscalable cliff. These men were the mountaineers of Switzerland. Wherever they crossed, Cæsar tells they were kept at bay by the "strength of the works and the concourse of the soldiers." At each point on the whole line the parapet and ditch interposed a barrier to hold the enemy until "by the concourse of the soldiers and by the missiles they desisted from the attempt."

In short Cæsar tells us plainly that he did construct a continuous *murum fossamque*; the work was not difficult under the circumstances, it was in keeping with the habits of the Roman soldier and there is no little reason for believing it to have been necessary.

However, this line of defense, of whatever nature it might have been, answered its purpose. The baffled Helvetians had to seek another route to their objective. It is not necessary to usurp the reader's function of studying the details of this or the succeeding campaigns. It is enough to say that Cæsar, after having by the greatest exertions collected a force strong enough to warrant him in risking a fight on open ground, followed and defeated the enemy in two successive battles. The campaign ended in his driving the decimated mountaineers back into the fastnesses of the Alps where he could rely upon their serving as a buffer to take the first rude shock of the wave of barbarism which his clear vision already saw rolling from the East through the Germanic forests. The whole operation, as an illustration of what may be accomplished by indefatigable energy, by supreme self-confidence, by a genius which already showed itself to be that of a master of the art of war, is well worthy of study for its own lessons and because in essential spirit it was a type of the campaigns that followed.

Our author in closing this part of his account steps aside to make an observation which should not be allowed to pass without comment. The final act of the campaign—the treatment of the six thousand Helvetians who violated the terms of the capitulation following the battle of Bibracte—is characterized as "one of those cases of unnecessary cruelty which blot the pages of Cæsar's campaign."

In numerous subsequent cases he returns to this same theme, generally with some expression of indignation against historians who, while failing to charge Cæsar with habitual cruelty, subject the characters of Alexander and Hannibal to that odious imputation. Indeed, it sometimes seems as though Colonel Dodge in the study of his two former heroes had exhausted his capacity for spontaneous admiration; whatever sentiment of this kind he shows for Cæsar seems often to be forced from him grudgingly as though it were a sort of treason against his first love.

That war, in those days of world conquest was not exactly a school of rural virtues, needs not saying. Nevertheless, judged by the standard of his own time and comparing the judicial nature of his occasional acts of severity with his habitual moderation Cæsar cannot fairly be called a cruel man.

Admitting that cruel acts are wicked acts, the moralist who is bold enough to hold

that war is not wicked *per se*, that is to say that it is right when necessary, must also admit that its accompanying acts are not wicked when necessary,—in other words, their cruelty is inversely as their necessity. And as the judgment of the necessity of a war must be left with those declaring it, so must the judgment as to the necessity of its minor acts be left to the general who orders them. If the judgment of these persons be honest though mistaken, we must absolve them from the charge of personal cruelty however much the abstract nature of their acts may merit that term. Thus there are many people—not Frenchmen—who believe the war of 1870 was cruel because needless, who nevertheless do not for a moment believe that behind the heavy brows of Bismarck and the old Kaiser lurked thoughts of gloating exultation over the bloody scenes that they looked upon.

And so, for many ages, in Cæsar's time, doubtless, as well as our own, all soldiers—who are no mean moralists in their way—have accepted the rule of expediency as the only safe test to be applied to the acts of war. As after a war is once begun the only justifiable object of its accompanying acts is the securing of a more lasting and honorable peace, so, any means which have a well recognized tendency towards the accomplishment of this object are justifiable and proper. As soon as experience shows that it is expedient to use such means it is right to use them. We hang or ignominiously shoot men who poison wells or use poisoned bayonets or explosive bullets, not because it is any more wicked to kill soldiers by such means than it is to blow their bodies to fragments with torpedoes or to explode thirteen pound shells inside them, but simply because experience has shown that the former means do no good. They only exasperate the contending parties and add an unnecessary degree of bitterness to the struggle without helping either side to attain the object of the war. Therefore, we agree to outlaw them and the people who use them. But suppose that all our experience pointed the other way; that to poisoned wells, for instance, nations in many instances owed their independence, their success in repelling ruthless invasion. It is more than probable that the poisoning of wells would be recognized as a legitimate means of warfare.

Judging his acts by this standard of expediency, in connection with a fair interpretation of the laws of war, I think that Cæsar must be acquitted of the charge of cruelty that our author brings against him. Three acts which have been generally the most condemned may be selected as types. These are his treatment of the six thousand Helvetians after the capitulation of Bibracte, of the Veneti after their naval defeat, and of the great horde of Germans who invaded Gaul in the spring of 55 B. C.

In the first of these cases, the Helvetians had surrendered to Cæsar and the compact had been completed with all the forms usual in such cases. They had accepted his terms which considering that their expedition had been simply a huge raid for plunder and murder were very moderate. These were that they should return to their own country and rebuild their towns. Cæsar agreed to find them in rations until they could raise another crop. Taking advantage of his faith in their word, six thousand of them quietly stole off under cover of the night and made for the Rhine. Not only was this an act of the basest treachery which merited death by all the laws of war, but it might have had the most serious and far reaching results for the army and the Roman people. It was not to be doubted that these men would eventually bring back with them one of those vast hordes of barbarians whose movement over the Rhine was so much dreaded by all clear-sighted Romans. It was just in that way that Ariovistus with an entire nation had been tempted into Gaul. Cæsar dreaded at every moment that one of these movements would come with such a rush as to sweep everything before it. And he, more than any one else of his time except Cicero, saw that before the savage onslaught Rome would be no more safe than were the petty tribes of half naked Gauls who dwelt on the hill slopes of the Vosges. So it was a double act of

treachery—one towards himself and one towards the fellow citizens of these faithless fugitives—that Cæsar had to punish. Exactly what form the punishment took, the delicate euphemism of the Latin phrase does not make clear to us. Probably he sold them into slavery.

In like manner his conduct towards the Veneti was justified by their deliberate violation of a rule of international law scrupulously observed by the Romans and as a rule by the most barbarous of ancient nations. They had seized the Roman ambassadors, loaded them with chains and held their liberty and lives as the price of concessions which they demanded in the terms of an existing treaty. Manifestly, Cæsar had nothing to expect but universal treachery if it were known that solemn treaties could be violated and the sacred persons of ambassadors be maltreated with impunity. If no reliance was to be placed upon their plighted word the only safety was in exterminating each nation after it was conquered. An act of the utmost severity, therefore, towards one faithless nation, the effect of which would enable him to have some confidence in the engagements entered into with other nations, cannot be called one of wanton cruelty. A precisely similar case in modern times is the putting to death of men who commit hostile acts while in the ordinary costume of the inhabitants of the country. Otherwise all the inhabitants must be classed as enemies and the horrors of war immeasurably increased. In this case Cæsar tells us in plain words that he did not slaughter these people except some few of the responsible leaders but sold them into slavery.

The third case grew out of one of the constant migrations of the Germans. What these invasions meant to the native peoples we know from the graphic account of the Ædui and Sequani who, as Divitiacus informed Cæsar, "shuddered at the cruelty of Ariovistus even when absent, just as if he were present," and who daily "endured all manner of tortures" at his hands. Cæsar had already once delivered Gaul from that scourge and here was a more terrible one coming. While engaged in negotiations with these people they treacherously attacked a part of Cæsar's forces and defeated it. The next day they had the effrontery to send another embassy to him. But it had now become evident that their only object was to gain time in order to allow some of their cavalry to come up. Cæsar knew by experience that they would keep no faith and that they must be attacked without delay. In all probability his preparations were already made, which these alleged ambassadors would betray on their return to their camp. He, therefore, very properly detained them while he moved to the attack. After a brief resistance the Germans fled, the Roman advance forcing them into the *cul-de-sac* formed by the junction of the Rhine and the Meuse. Here it is probable that they suffered their greatest loss. In their frantic endeavors to escape they threw themselves—men, women, and children—into the river and there most of them perished.

It is not fair to call this a wanton massacre. In all these campaigns there is no case where Cæsar refused to accept a surrender. There is no reason to believe that he would have refused it now. But these Germans gave no quarter and evidently expected none. That a fleeing enemy, declining surrender, should be cut down by their pursuers was as common and as proper then as now. And it surely was no fault of Cæsar's that these people should prefer to throw themselves into the river rather than surrender. Of course the terrible loss of life would have been avoided if after the retreat began Cæsar should have declined to pursue. But if Cæsar had done that he would not have been a "great captain," and Colonel Dodge would have been without a subject for his book.

That it was an awful tragedy which, during these eight years, was acted in the green woods and by the pleasant rivers of that beautiful country, cannot be denied.

Those tremendous euphemisms of the commentaries—*sub corona vendere* "*reductos in hostium numero habuit*," "*more majorum supplicium sumsit*" conceal a story of suffering the details of which, thank God, the world will never know. But it is the story of the conflict between civilization and barbarism since the beginning of the world. Curiously enough the sentiment of the spectator is always on the side of barbarism. But it is a sentiment that we need not quarrel with since the sober judgment of the spectator also concedes that the world would have been worse had these things not been. It is an exceedingly pathetic picture, that of the magnificent barbarian, Dumnorix the Æduan, deserted by the people, struggling single handed with the legions until he falls covered with wounds and exclaiming with his dying breath, as Cæsar tells the story, "*liberum se liberaque civitatis esse*." But what has it ever availed any man in the conflict with the newer and better order of things, to be "the free citizen of a free country" when that country is simply barbarism standing in the path of civilization?

And it is well for us to understand what this barbarism meant to Cæsar's legions. Germans and Gauls and Britons were alike in the infernal cruelty which they practiced on their prisoners. The ravens and the wolves fed fat in the path of a German invasion. Wherever these people settled they turned the country for a space of fifty miles around their territories into a desert waste in which no green thing could grow and from which arose an intolerable stench from the decaying bodies of women and children slaughtered by the ashes of their homes. The Gauls burned their prisoners by batches in great wickerwork frames; or they bound them to trees, subjected their bodies to every conceivable form of torture and ended by roasting them over a slow fire. And, as with our North American Indians, the women and children were active agents in this sort of work. It was through such scenes that for eight years the legions marched and fought. Many and many a time must the soldiers have peered over the parapets of some beleaguered camp and with blanched faces, with eyes starting from their sockets, watched the awful tortures inflicted upon wounded and captured comrades. We need not go beyond our own time and country to know that the spirit engendered by such sights even in the most civilized soldiers, is not exactly one of christian charity. And so Cæsar's legions became such as the British were, as Napier describes them at the storming of Badajos, "the strong desire for glory was dashed with a hatred of the citizens on an old grudge, and recent toil and hardship, with much spilling of blood, had made many incredibly savage." But as Wellington in the one case must be acquitted of the charge of personal cruelty so must Cæsar in the other.

For the details of these campaigns the student is commended to Colonel Dodge's work where he will find them clearly and fully discussed. In three campaigns Cæsar reduced the whole of Gaul with one slight exception to obedience to the Roman power. He had driven the Helvetians back into the Alps and had cut to pieces the German invaders under Ariovistus, thus making the Rhine the eastern frontier of the empire in this part of the world. Then he scattered the dangerous confederacy of the Belgæ, and after two attempts he secured the whole north coast except a short part laying to the east of the Rhine mouths. Now come another of those exasperating invasions of the Germans, threatening to undermine the foundations of Roman influence which he had laid with such care. Again he annihilated their forces, and by the terrible blow which he inflicted, freed Rome from danger in this direction for several centuries. After two expeditions to the island of Britain undertaken with a view to overawing a people whose country had been a safe refuge for discontented Gallic Chieftains, he found the flames of insurrection blazing about his winter camps along the north coast. After a severe struggle the Gauls once more relapsed into a state of quiet obedience to the new regime. It was the deceptive lull before the storm. Under

Vercingetorix was made the last and most formidable attempt to regain their ancient liberties. Avaricum, Gergovia and Alesia are the classic names in which the interest of this final struggle centres. For a time it seemed that Cæsar's fortune had deserted him and that not he but Vercingetorix was to be the master of Gaul. Fortunately, for the civilization of Europe, this was not to be. The campaign ended with the utter extinction of all resistance.

The following campaigns possess less interest for the military student. With Alesia we know all that need be studied of Cæsar's tactics and strategy. After that the mere military interest is swallowed up in the all absorbing political interest which attaches to every step of his remaining career. Of the five years that were left of his life he spent but little more than one in Rome. He drove Pompey, and the Senatorial party which had already throttled the Republic, the whole length of Italy and then across the Adriatic. At Pharsalia and Thapsus he practically destroyed the power of the oligarchy, though peace was not finally assured until, the seat of war having been transferred to Spain, he defeated at Munda the last adherents of the Senate.

Cæsar's military career, short as it was, nevertheless was long enough to accomplish the most important results ever achieved by one man in the longest life that has been lived upon this earth. While the Commonwealth was split up into contending factions, ready to become a prey to the first savage invader who should follow in the steps of Brennus, he stood without, building a barrier that was to stand for many generations. And while the northern barbarians were vainly trying to beat this barrier down, behind it the language which has become the language of one-half the civilized world and which has powerfully influenced the other half was gradually attaining its perfection of strength and majesty. Behind it was established a government which for good and evil has been imitated by monarchies and republics alike to our own day. There that body of law was formed which has governed civilized men in their domestic and international relations for near two thousand years. And here was finally established that religion which first followed and now carries the influence of Rome into all the earth.

That which checked the destructive forces from without long enough to enable this to be done was the conquest of Gaul by Cæsar. Had not that great work been first and thoroughly accomplished, all that Cæsar afterwards did would have been in vain.

Therefore, as we close Colonel Dodge's admirable work, after having followed it to its conclusions, our mind instinctively reverts to that period when the foundation of all modern civilization was laid and cemented, and with a peculiar pleasure we reflect that the very generation that Cæsar crushed so ruthlessly was the first to feel the beneficent influences of his work.

No sooner was his final victory won than Gaul began to adapt herself to the new order of things and became a rich and contented province. Within a hundred years from the capture of Alesia the Gauls had made comparably greater progress in all the arts that refine and civilize than they had before in the time since the first palæolithic man carved mammoth-tusks in the caves of Perigord. The language and the laws of Rome were carried north of the Alps. The seeds were planted which after the long germination of many centuries ripened into well-nigh the fairest civilization of this nineteenth century world. And in the full completion of her destiny, modern Gaul has paid the last tribute to her ancient conquerors by assuming at least the outward form and symbols of the Great Republic whose legions first taught her the way to union, safety and glory.

TASKER H. BLISS.

**The Story of a Cavalry Regiment.\***

This story of a cavalry regiment is the story as well of the troops associated with it, and its scope is such as to make it in reality a chapter of the history of the war. It is not easy to find another so vivid an account of the trials and discouragements which beset the cavalryman in the early part of the great war, nor, on the other hand, to find such a glowing narrative of his achievements in its closing scenes. The story of Wilson's Raid in the spring of 1865 through Mississippi, Alabama and Georgia, as told by the author, reads like a page from the first conquest of Mexico. Never before was cavalry called upon to perform such deeds, and never before were they so brilliantly executed.

In coming years our descendants will read with intensest interest the records of the regiments in which we served, and the descendants of the members of the Fourth Iowa Cavalry will surely be thankful to him who has so plainly and so vividly told the story of its achievements.

W. L. H.

**A Manual for Courts-Martial.†**

Lieutenant Arthur Murray of the First Artillery appears to have made good use of the opportunities afforded him by his service as Acting Judge Advocate, Department of the Missouri, as is evidenced by his Manual for Courts-Martial, the third edition of which has recently been published. The work is an amplification of the Circulars of Instructions issued from time to time from the different Military Headquarters. It is, however, more comprehensive than any of its predecessors and embraces all information that is absolutely essential to enable an officer to intelligently perform the duties of member of a military court, and sufficient to guide a judge advocate in the trial of ordinary cases. It is marked by clearness and conciseness of statement, and is sufficiently complete in setting forth methods of procedure, forms for pleadings, etc. It is *multum in parvo*, and a copy should be in the hands of every officer of the Regular Service and the National Guard.

X.

**Use of Portable Armor.‡**

Captain Julius Meyer has made a very interesting study of the use of portable armor in fortifications on Swiss territory.

Captain Meyer's ideas took shape after the invention by Lt.-Col. Schumann of the armored gun-carriages constructed at the *Grusonwerk* near Magdeburg in Prussia.

The movable fortifications proposed consist of small turrets in which is mounted a quick fire or machine gun, these turrets being placed in positions where they can command as wide a sweep of ground as possible. This class of armor is exceedingly inexpensive and costs from \$3000 for the 12 cm. armored shell gun to \$1000 for the portable armored lookout. The calibre of guns which Captain Meyer supposes to be adapted for use in the Swiss army, are 5.3 cm. for the movable armored cannon, and 12 cm. for the portable shell guns. It is not to be inferred, however, that the same class of armor cannot be perfectly well adapted to any of the smaller classes of quick fire guns.

\* *The Story of a Cavalry Regiment.*—The Career of the Fourth Iowa Veteran Volunteers. By Wm. Force Scott, late Adjutant. New York: G. P. Putnam's Sons, 1893.

† *A Manual for Courts-Martial.*—Prepared by Lieut. Arthur Murray, Late Acting Judge Advocate First Artillery, U. S. A. John Wiley & Sons, Publishers, New York, 1893.

‡ *Emploi des Cuirassements Mobiles dans les fortifications sur territoire Suisse.* Par le Capitaine Julius Meyer. H. R. Sauerlaender, Aarau—1891.



Captain Meyer divides his pamphlet into five different heads. First, the characteristics of fortifications of the present time; second, the military and political parts taken by fortifications in general; third, technical properties of portable armored gun carriages; fourth, the technical rôle of armor in the combined use of different arms; and fifth, the strategic importance of parks of portable armors. It is unnecessary to consider the first or the second of these chapters as being merely introductory, and as containing no information which is not already possessed by officers of our service. The third chapter is interesting as giving in detail the arrangements of these armored carriages.

In this we gather that the armored quick-fire gun, including the two-wheeled carriage, weighs 3260 kg. The carriage alone weighs 690 kg. The steel arched hood, 40 mm. thick, acting as a shield, has a diameter of 1.40 m. and rises only 40 cm. above the horizon of construction. The armored mantelet is 1.20 m. high and 1.60 in diameter; the total length is 1.90 m. on account of the space necessary for entering it. The gun is fastened to the hood itself and can be readily and quickly turned with the latter so that it is always possible to fire in any direction; for this purpose this piece is provided with a hand apparatus by which to aim either horizontally or vertically. The rotating mechanism, convenient seats for two cannoneers, all the implements for the gun and a magazine containing 130 projectiles are placed inside of the armored mantelet. The little turret is so arranged that it can be placed on its limber without difficulty, to be taken out of the way when required. Three horses are required to move it. Two men are sufficient to serve a piece, one of them doing the duties of chief of piece, loader, aimer and firer. The other hands him the ammunition which he takes out of its boxes.

The effective range of the 30 mm. gun is 4500 m. The projectiles are ordinary shells, segmental shells and steel shells, shrapnel and canister. They can deliver 40 shots a minute.

The 12 cm. howitzer weighs 18,500 kg. with piece, and 19,000 kg. if the rear armor be added. The hood, the rear armor, cylindrical mantelet, piece and interior rotating mechanism can be transported separately, and all put together very readily. When everything is ready, and the ground is favorable, it only requires 24 hours to set them all up. This time may be extended under unfavorable circumstances to two or three days. To withdraw one gun and replace it with another requires ten minutes. Three men are sufficient for the service of this gun. Inside the armor is the magazine containing 600 rounds. The fire is at the rate of 10 rounds a minute and the effective range is 5000 m.

Such in general terms are the general characteristics of the two armored carriages which may be supported in some cases by fortress, siege or field artillery, unarmored, but placed in positions where good cover can be had.

In chapter four the author discusses the formation of a battery of 5.3 cm. guns. The personnel for four guns requires one non-commissioned officer as chief, and eight gunners, or, if three reliefs be required, then three non-commissioned officers, 24 gunners with 12 draft horses.

Three such batteries form a company requiring one commissioned officer, 12 non-commissioned officers, 78 men and 36 draft horses, there being added in the company three non-commissioned officers and six men for special service. Three companies form a battalion with six commissioned officers, 40 non-commissioned officers, 240 men and 120 horses with 36 armored carriages for 5.3 cm. guns.

The author then goes on to discuss the numbers required for the personnel of such a service and the reasons which have led him to adopt the numbers which he has assigned. It is unnecessary to follow him through all this, nor is it necessary to follow



him through the hypothetical case of an action in which this portable armor is used, and very advantageously, according to given data. The actual test of anything of this sort must be war, and until its usefulness is confirmed by actual trial in the field, it seems needless to attempt to review the theoretical discussion, short though it be.

In the fifth and last chapter where the strategic importance of this class of armament is discussed, there are several useful ideas. The author assumes that a certain number of guns are necessary for Swiss territory. These he sets down as being 216 5.3 cm. guns, 36 12 cm. howitzers, and 18 observing turrets. The total cost of these parts, together with 100,000 cubic metres of wire for the establishment of telegraphic and telephonic communications, is about \$800,000.

The author assumes that the pieces have been accumulated in store at some central point whence they can be readily transported toward any threatened portion of the frontier; that the wells in which they are to be placed have been excavated some time in advance as a part of the regular fortifications of the place, and that all it becomes necessary to do is to move these pieces to the places assigned to them and to set them in position, which he thinks can be done within a space of very few days. In this way threatened points can be made ready for attack in less time than it would require the attacking force to concentrate its troops and make its advance. These ideas again become, of course, speculative, but, on the other hand, there could be no difficulty whatever in making all desired preparations to move at the proper time, and thorough proficiency in making these changes can readily be obtained by practice during times of peace.

So far as the strategic importance of the movable armor is concerned, Captain Meyer proposes to have his batteries assembled at some central point whence they can be forwarded to any threatened position with the least loss of time, in order to have them on the ground and sunk to their proper depth before the enemy has had an opportunity of coming up in front of the place towards which his operations indicate his advance. In his opinion it is entirely unnecessary to have the positions for this movable armor fixed beforehand, as would be necessary if the revetments of the positions were constructed of masonry. Masonry, to be sure, is durable, but it requires time to construct, and in these days of information so generally scattered around, it is always possible for a potential enemy to be informed of the location of anything like permanent works.

With the old fortifications much time and labor were necessary to put them in a proper condition of defense. With the new, the work can all be done in a very short time, as he claims not more than two or three days are necessary to entirely protect a front with a number of these light engines of war. Another advantage is claimed by him in the fact that this movable armor can all be limbered up on the cars which transport it, so as to be ready to land the instant that the train reaches its destination.

If it should be judged necessary to maintain a certain number of these engines at the most important points, instead of having everything grouped at one central station, it can readily be seen how much easier it would be to bring them into place and have them ready for action within an exceedingly short time after a declaration of war.

Captain Meyer winds up his pamphlet in the following words:

"In the cases mentioned, and in many others like them, movable armor renders invaluable service because it may be employed in all sorts of fortifications both permanent and temporary.

"The battery of movable armor is more quickly established than the simplest field redoubt, and more quickly than skirmish trenches for men firing kneeling.

"Troops occupying a field redoubt and skirmish trenches may be annihilated by field artillery, and shells loaded with gun-cotton can batter breaches completely through the parapets of these works.

"The armored battery, on the other hand, can only be displaced after an extremely long struggle either with armored carriages of equal strength, or with an overwhelming number of heavy guns.

"No other style of fortification possesses such a great defensive strength, none other is so independent of the ground, so movable, so quickly established, and none other can be defended with such a small number of movable forces as the *armored front*."

How Captain Meyer's ideas may be received, and what their ultimate value may be after the crucial test of war shall have been applied, cannot be foretold. In any event, the subject is one which is well worth considering, when the enormous expense of modern wars and modern fortifications and guns is taken into consideration, and anything which may lead to equally effective defense with diminished outlay, should receive serious attention. It is useless to remark that the system as proposed, is only of value for land fronts, and that it is wholly useless along the water frontier except to prevent the actual landing of armored forces on the shore in case of an attack from the sea.

F. A. MAHAN.

### The Hawaiian Islands. Military Information Division. Number 1.\*

The attention of the civilized world has been concentrated for some weeks past on the little kingdom of Hawaii where the changes in government and subsequent application for a protectorate have again brought into prominence the strategical and commercial relations which these islands bear to the United States.

Standing by themselves amid a vast expanse of practically open sea and directly in the track of all steamers sailing to Australasia from San Francisco or Puget Sound, they form the centre of a large circle whose radius is approximately the distance from Honolulu to San Francisco. North of the equator and between America and Asia, they constitute the only land at which a ship can touch. They have a harbor capable of sheltering the navies of the world and in case of war would be indispensable for a coaling and supply station.

The essential public interest attaching to these islands grows out of this central position in the present commerce of the Pacific Ocean. But even more precisely is Hawaii in the direct route of one part of that enormous traffic from Atlantic to Pacific ports which awaits the cutting of the Nicaragua ship canal.

All the trade with China and Japan from American ports on the Atlantic must take the Nicaragua route. It is this large movement of ocean commerce impending in the near future which lends such serious importance to the political relations of the Hawaiian Kingdom.

Great interest has been aroused on all sides concerning this question, and it is fitting therefore that the newly formed Military Information Division of the Adjutant-General's Office should devote its initial number to the consideration of a matter of such consequence to the future well being of our country.

The pamphlet, or report number one, gives ample information concerning the situation of the islands, means of communication, area and geographical features, soil, climate, population, laws, government, commerce, resources and manner of life.

\* *The Hawaiian Islands with Maps and Charts.* War Department, Adjutant-General's Office, Military Information Division. Number 1.

The maps, six in number, are excellent and fully illustrate the relations, strategic and commercial, which these islands bear to the United States and to the various trade routes which now centre at Honolulu or which will centre there upon the cutting of the isthmian canal.

We may hope much from a series so auspiciously begun.

J. C. B.

### Abridgment of Military Law—Winthrop.

Lieutenant-Colonel Winthrop has taken a change of venue, so to speak, since the last edition of the Abridgment made its appearance, and decidedly to the advantage of all concerned. The new volume, just issued by John Wiley & Sons of New York, is a decided improvement as regards mechanical execution, over its paper-backed and cheap-appearing predecessors. In its new dress it is an attractive appearing as well as convenient book.

The learned author's works on military law are familiar to the army. During a quarter of a century his name, as the compiler of Digests of the Judge-Advocate-General's opinions, and as writer of an elaborate treatise on the law military, of which that now under review is an abridgment, has been prominently before the military and legal world.

Those acquainted with the Digests will recognize the sources whence comes the peculiar vein of legal interpretation which permeates and gives distinctive character to the Abridgment. And while no doubt many will dissent from the construction of the law frequently given by the author, none who read it carefully will fail cheerfully to bear testimony to the sedulous care with which he strives, according to his best lights, to guard by proper precepts the fair fame and honor of the profession of arms.

The views of the Digest, and its theories, are not those of the army. For fear that this important fact might be lost sight of the War Department in General Orders No. 3, A. G. O., 1881, cautioned the army against drawing such a conclusion from the mere fact that permission to publish it had been given. The very atmosphere of the Digests is that of the Abridgment. The same channels of thought ramify both. If the original is to be accepted with caution, equally so must be the copy.

The most prominent feature of the Abridgment is the apparent fact that the author, how learned soever he may be in the law, has but an imperfect appreciation of the true nature of military discipline. To be of most value military law books should be written by those who through association with it know the army intimately, not by those who view it at a distance and merely as an abstraction. There is no doubt, for instance, but that the army has suffered in recent years through the well-meant yet misguided and illy-considered efforts at so-called amelioration of those who did not understand the ultimate effects of their measures.

It is more than doubtful whether labored attempts such as those (pp. 18, 19) to assign courts-martial places in the category of civil (as distinguished from military) courts are not productive of much more evil than good. All such comparisons fail because of want of similarity in origin, objects, and principles governing the two classes of courts. Civil courts (*i. e.*, civil proper and criminal) belong in the economy of most well regulated governments to the judicial branch; courts-martial, as stated in the Abridgment, to the executive. A criminal court has jurisdiction only of crimes. A court-martial takes cognizance, on the other hand, of all acts prejudicial to military discipline, though they be nothing more than mere neglects, such as failure to be present at guard-mounting, or to meet pecuniary obligations promptly, or appearing under the influence of liquor, although the accused might have been thoroughly well behaved. Now none of these acts would be crimes in the eye of the criminal law of

the land. Not one of them could be given any standing in a criminal court. What useful purpose, therefore, does it serve to insist that courts-martial which take cognizance of them are criminal courts exclusively? It does no good, on the contrary, it does harm. It distracts the minds of the military youth from the true nature of a court-martial, which is that of a court of honor, as the author elsewhere truly remarks. That courts-martial follow generally the common-law rules of evidence, as observed in United States criminal courts, in nowise affects the truth or justness of this statement. The Senate when sitting for impeachment observes the same rules. As the author again points out (p. 119) courts-martial depart from these rules when necessary to attain the ends of justice.

The Abridgment, as we are informed in the preface, is intended primarily as a text book for West Point Cadets. It is impossible to overestimate the care with which a work written for such a purpose should be prepared. There is no course of study at the Academy which subsequently enters more constantly and generally into the professional life of the great mass of officers than that of the law. Hence the importance of giving the cadets correct ideas on the subject. Not that it is expected or desired that they will become lawyers. Far from it. But it undeniably is true that the great majority of officers, from the time they join the army until they leave it are frequently sitting on courts and boards, etc., or acting as Judge-Advocates or Recorders of the same, in such manner as to call in requisition their legal knowledge. Nor is this all, nor half. Those officers who serve with troops, and they are by far the greater number in the army, have constantly, as an every-day affair, to refer to the laws and the regulations in administrative and disciplinary matters. It is this experience which teaches them what the man, soldier, is like, and how managed to the end that the army may be what the country pays for and expects it will be,—a well-organized, efficient fighting machine. Hence the great importance of giving cadets correct legal ideas. Quality, not quantity, is the great desideratum.

The Abridgment correctly points out (pp. 35, 43) that an offense may have two distinct aspects—a military and a civil—punishable by two distinct and appropriate jurisdictions. But when, as seems to be the case, the crimes enumerated in the 58th Article of War are alleged to be cognizable by military courts only in time of war, the asseveration is believed to be contrary to law. If true it leaves the military community in camp and garrison entirely defenseless against the evil doers in their midst, except through the instrumentality of civil courts. A soldier at West Point might break into the superintendent's quarters, be caught in the act of burglarizing, and yet military courts be without jurisdiction to try the case. Such doctrines will not do. The practice of the army is contrary to it. It must be so. Sergeant Mason's friends tried to save him from the consequences of military trial by claiming that his crime against the assassin Guiteau—assault with intent to kill—was triable by a court-martial in time of war only, but the impotent plea was repudiated by the Supreme Court of the United States.

Closely allied with this construction of the 58th comes a verbal modification (pp. 43, 277, 303) of the 62d Article of War, the effect of which, if permitted to go unchallenged, must be greatly detrimental to the interests of the service. The latter article takes cognizance of certain crimes, disorders and neglects "to the prejudice of good order and military discipline." The learned author has essayed to interpolate the word "directly" as qualifying the character of the prejudicial conduct. This is believed to be entirely unwarranted. The Article, the most important, if we may institute comparisons, of any in the code, gives no countenance to such language. It simply speaks of conduct "to the prejudice," etc. There is no "directly" about it. To admit this interpretation, or interpolation rather, would be the worst thing that

could happen to the army, at least the soldier part of it as contradistinguished from the mere staff. Let an offense of the character mentioned in the 62d Article be committed, and, if this interpolation be sanctioned, what is the result. The conduct is admitted to be "to the prejudice of good order and military discipline." At once a learned discussion arises as to the "directness" or "remoteness" of that prejudice. Meantime discipline, which requires an example, suffers; the soldier lawyers wrangle; the issue becomes not whether good order shall be insisted upon, but whether the offense has or has not that particular texture of "prejudice" which renders it cognizable by a military court. May the time never come when such ideas get a foot-hold—which happily they have not now—in our service. Why, then, should cadets be taught such things?

There seems to be (pp. 60-1) a good deal of confusion in setting forth the relative functions or characteristics of the Charge and Specification. This will always be so, unless it be remembered that the drafting of these, like pleading before the civil courts, reduces itself to a syllogism, the major premise being an unexpressed but accepted rule of law, the minor premise those facts set forth in the Specification which bring the particular case within the accepted rule, and the Charge the conclusion of law following from these premises. Logically, therefore, the Charge should follow the specification, and that it does not with us is a mere custom of service. It follows from this that it may happen that two or perhaps more charges may be apposite to the same specification, just as two or more perfectly correct conclusions may sometimes be drawn from the same premises in other courses of reasoning. It is only in accordance with this view of the subject that what is said (p. 95) regarding pleading guilty to the specifications but not to the charge can be accepted as true.

In this connection the remarks of the author (p. 64) regarding the signing of charges by some responsible officer are pertinent. It is unfortunate that the customs of our service are just what they are in this regard. It is a very common thing for charges to be referred to a Judge-Advocate of a General Court-Martial unsigned. This is to be regretted, whenever done. On paper it gives the Judge-Advocate the air of prosecutor. He must sign them, in any case, under the direct or implied order of the Department Commander; but does this fact not bring the latter within the limitations of the 72d Article of War? The fact is that the person responsible for charges being preferred should be required to sign them. This cannot too soon become the custom, but it is not now. The accused, in all fairness, should know who his accuser is.

On page 75 it is stated that a Judge-Advocate must not be biased. There is believed to be no warrant for this rule of a Judge-Advocate's qualifications. It is true that the language is so explained away immediately as to deprive it of all meaning, but the assertion itself is believed to be devoid of foundation either in law or custom. The Judge-Advocate is not challengeable. In very many cases he is bound to be prejudiced more or less against the accused. He knows things perhaps that cannot be laid before the court to affect his personal judgment. But who is to judge as to his prejudice? If the accused, and this judgment is to govern, then many cases would not be tried for want of a Judge-Advocate.

There are noticeable divers errors of fact throughout the work, for instance, (p. 69) that the court must assemble in full uniform, in which connection attention is invited to par. 1766, Army Regulations, as modified by G. O. 103, A. G. O., 1890; (p. 163) that records of previous convictions may be submitted of offenses whenever the latter were committed, as to which attention is called to par. 3, G. O. 21, A. G. O., 1891; (p. 215) that the accused may object to trial by a summary and demand trial by a garrison court, in which connection attention is called to the Act of October 1st, 1890

(published in General Order No. 117, A. G. O., 1890), where it is seen that the accused has a right to ask trial by "court-martial," but not to specify the kind—the distinction being of practical importance; (5. 184) that a non-commissioned officer can be reduced by his regimental commander on application of his company commander, as to which attention is called to G. O., No. 97, A. G. O., 1890, and 29 of 1891; and other mistakes of like nature. Such errors are doubtless inadvertencies, and not easily avoided.

The arrangement of the subject matter in the Abridgment is logical. There are few typographical errors, and the work throughout evinces conscientious, painstaking labor, and a jealous care for the honor of the service, and the interests of discipline, as the author understands the latter. But unless the instructors who use it as a text-book are able to explain wherein it falls short of the true army disciplinary standard, cadets will imbibe many notions from it which they will have only to unlearn, under every disadvantage, in the service.

It is to be hoped that the time is not to be indefinitely postponed when a soldier as well as a lawyer will write a text-book for West Point Cadets. We need another De Hart.

The author takes the correct view of military government and martial law. But the reference is so brief that it is almost valueless. The same remark is true regarding the consideration given the subject of the civil responsibility of the military. One cannot but wish that some of the pages devoted to explaining to the rascals of the army how they best can defend themselves are not given to these latter and more important topics.

WM. E. BIRKIMER.

### Alternating Currents.\*

The great and growing importance of alternating currents renders it absolutely necessary that the electrician and engineer should understand the principles upon which this branch of electrical science is based, but up to the present the absence of a connected treatise on the subject has been a very serious handicap.

The present work is the first book that treats the subject in a connected, logical and complete manner. The principles are gradually and logically developed from the elementary experiment upon which they are based and in a manner so clear and simple as to make the book easily read by any one having even a limited knowledge of the mathematics involved. By this method the student becomes familiar with every step of the process of development and the mysteries usually associated with the theory of alternating currents are found to be rather the result of unsatisfactory treatment than due to any inherent difficulty.

The first fourteen chapters contain the analytical development commencing with circuits containing resistance and self-induction only, resistance and capacity only and proceeding to more complex circuits containing resistance, self-induction and capacity, and resistance and distributing capacity. A feature is the numerical calculations given as illustrations.

The remaining chapters are devoted to the graphical consideration of the same subjects, enabling a reader with little mathematical knowledge to follow the authors, and with extensions to cases that are better treated by the graphical than by the analytical method.

Parts of the book have appeared as separate papers in *The Electrical World*, London

\* *Alternating Currents: An Analytical and Graphical Treatment for Students and Engineers.* By Dr. Frederick Bedell and Dr. Albert G. Crehore. New York: The W. J. Johnston Company, Ltd. 325 pages, 112 illustrations. Price \$2.50.



*Electrician*, *Philosophical Magazine*, *American Journal of Science* and the *Proceedings* of the American Institute of Electrical Engineers and have met with very favorable comment. *La Lumière Electrique* at the conclusion of a review of the published papers, extending through several numbers, states: "The work of Drs. Bedell and Crehore constitutes the most complete and didactic treatment thus far made—all the demonstrations are satisfying from their simplicity and exactness."

The work has already been adopted at the University of California, University of Illinois, and Purdue University, as well as at Cornell, and immediately takes its position as an authority because of the numerous scientific papers by the authors which have been appearing in England and France as well as in this country, and which have received favorable editorial comments in the leading journals here and abroad.

### RECENT MILITARY ARTICLES OF SPECIAL INTEREST.

*Harper's Monthly*, April.

"In the Barracks of the Czar." By Poultney Bigelow.

*Scribner's Magazine*, April.

"Historic Moments: The Crisis of the Schipka Pass." By Archibald Forbes.

*The Forum*, March.

"Hawaii and Our Future Sea-Power." By Captain A. T. Mahan, U. S. N.

*The United Service*. (Hammersly.)

"Reforms Needed in the Paper Work of the Army." By 1st Lieut. Alfred M. Palmer, 14th Infantry. (An excellent suggestion.)

"The Status of the Non-commissioned Officers in the United States Army."

*Journal of the U. S. Cavalry Association*.

"Cavalry Upon the Field of Battle." Translated from the Russian by 1st Lieut. Geo. W. Read, 5th Cavalry.

"Smokeless Powder in its Relation to Cavalry Efficiency." By Major Moses Harris, 8th Cavalry.

"Gaits and Gaiting of Horses." By Lieut. William H. Smith, 10th Cavalry.

"Conversations on Cavalry." By Prince Hohenlohe. Translated by Lieut. Carl Reichmann, 9th Infantry.

"The New Revolver." By Lieut. Eben Swift, 5th Cavalry.

"The Cavalry Horse: His Mental Condition and Physical Nature." By Captain A. G. Hennisee, 8th Cavalry.

"The New Cavalry Bit."

*Journal of the Royal United Service Institution*, March.

"Electric Balloon Signalling." By Eric Stuart Bruce, M. A., Oxon.

"The Tactical Employment of Engineer Field Companies in Combination with other Arms."

"The Different Systems of Signalling in the Field." By Colonel F. G. Keyser, C. B.

"The Buonaccorsi Automobile Torpedo." Translated by T. J. Haddy, R. N.

"The German Field Artillery Exercise, 1892."

"The Magazine Rifle, 6.5 mm. Calibre. Mannlicher System." Translated by Captain F. L. Nathan, R. A.



*Proceedings of the Royal Artillery Institution, March.*

"Recent Development of Armor and its Attack by Ordnance." By Captain Orde Browne, late R. A.

*Professional Papers of the Corps of Royal Engineers.*

"Electric Welding." By Graham Harris, M. Inst. C. E., M. Inst. M. E.

"Alternating Currents of Electricity: Their Generation, Measurement, Distribution and Application." By G. Knapp, M. Inst. C. E.

"The Application of Works to Irregular Ground." By Captain S. D. Reeve, R. E.

"Lists of Service Ordnance, with Details of Guns, Ammunition, Carriage and Slides."

*The United Service Magazine (London).*

"Achievements of Cavalry." By Lieut.-Gen. Sir Evelyn Wood, V. C.

"The French Language: Hints on its Practical Study." By M. Deshumbert, Professor of French Staff College.

"The Infantry Attack." By F. N. Maude.

*The Saturday Review.*

"The Fire Effect of Cavalry."

\* J. C. B.

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## ARTICLES ACCEPTED FOR THE JOURNAL.

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*Experience of the Past the Best Guide for the Future,*

By COL. J. G. C. LEE, Q. M. Dep't.

*Army Regulations,*

By LIEUT. H. B. MOON, Adj't. 20th U. S. Infantry.

*Is the Three-Battalion Organization the best for us,*

By CAPT. F. H. EDMUNDS, 1st U. S. Infantry.

*Company Papers,*

By CAPT. G. P. COTTON, 1st U. S. Artillery.

*Military Sanitation in the 16th, 17th and 18th Centuries,*

By MAJ. C. L. HEIZMANN, Med. Dep't.

*Some Suggestions upon Arms; etc.,*

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DEXTRINE,		2.4		FATTY SUBSTANCES,			2.6	
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## Prize Essay—1893.

I.—The following Resolution of Council is published for the information of all concerned :

*Resolved*, That a Prize of a Gold Medal of suitable value, together with a Certificate of Life Membership, be offered annually by THE MILITARY SERVICE INSTITUTION OF THE UNITED STATES for the best essay on a military topic of current interest ; the subject to be selected by the Executive Council and the Prize awarded under the following conditions :

1. Competition to be open to all persons eligible to membership.\*
2. Each competitor shall send three copies of his Essay in a sealed envelope to the Secretary on or before September 1, 1893. The Essay must be strictly anonymous, but the author shall adopt some *nom de plume* and sign the same to the Essay, followed by a figure corresponding with the number of pages of MS.; a sealed envelope bearing the *nom de plume* on the outside, and enclosing full name and address, should accompany the Essay. This envelope to be opened in the presence of the Council after the decision of the Board of Award has been received.
3. The prize shall be awarded upon the recommendation of a Board consisting of three suitable persons chosen by the Executive Council, who will be requested to designate the *Essay deemed worthy of the prize*; and also in their order of merit those *deserving of honorable mention*.
4. The successful Essay shall be published in the Journal of the Institution, and the Essays deemed worthy of honorable mention shall be read before the Institution, or published, at the discretion of the Council.
5. Essays must not exceed twenty thousand words, or fifty pages of the size and style of the JOURNAL (exclusive of tables).

II.—The Subject selected by the Council at a meeting held Nov. 11, 1892, for the Prize Essay of 1893, is

### "THE NICARAGUA CANAL IN ITS MILITARY ASPECTS."

III.—The gentlemen chosen by the Council to constitute the Board of Awards for the year 1893 are :—

BRIGADIER-GENERAL THOMAS H. RUGER, U. S. A ,  
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GOVERNOR'S ISLAND,  
January 1, 1893.

\*"All officers of the Army and Professors at the Military Academy shall be entitled to membership, *without ballot*, upon payment of the entrance fee. Ex-officers of the Regular Army of good standing and honorable record shall be eligible to full membership of the Institution *by ballot* of the Executive Council.

"Officers of the United States Navy or Marine Corps shall be entitled to membership of the Institution *without ballot*, upon payment of the entrance fee, but shall not be entitled to vote, nor be eligible to office.

"All persons not mentioned in the preceding sections, of honorable record and good standing, shall be eligible to Associate Membership *by a confirmative vote* of two-thirds of the members of the Executive Council present at any meeting. Associate Members shall be entitled to all the benefits of the Institution, including a share in its public discussions, but no Associate Member shall be entitled to vote or be eligible to office."

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THE following named officers have volunteered, or have been designated to prepare Historical Sketches of their Corps or Regiments for publication in this JOURNAL.

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\* Published in JOURNAL.

## THE MEDICAL DEPARTMENT, U. S. ARMY.

BY MAJOR CHARLES SMART, SURGEON U. S. A.

THE Medical Department of the United States Army is as old as the United States, for when the patriot shouldered his rifle and sallied forth to see what was happening on the road to Lexington, the doctor hastily replenished his saddlebags and went out to help such of his neighbors as might require his professional assistance; and by-and-bye, when the patriots became organized into companies and regiments, the doctor stayed with them, having been provided with an official status to warrant him in doing so. This authority came at first from the colonels of regiments, and the surgeons so appointed were authorized to select their own assistants or mates, as they were then called; but the incompetency of this method to secure an efficient medical service was soon manifest, and the Provincial Congress of Massachusetts Bay took the matter in hand, requiring each candidate for a position in the Medical Department of the Army to be subjected to a close examination by qualified medical men. There was nothing *pro forma* in these examinations; for it is on record that no less than six of a set of fourteen were rejected on account of failure to come up to the standard. Examination to determine fitness is a recent requirement in the United States. The Civil Service Commission belongs to the last decade, and it is only the other day that military officers became subject to examination for promotion; but medical men were examined for service in the military body away back in 1775, and the system then instituted has never ceased to be the rule.

The Provincial Congress discovered also that something more was required for the proper care of soldiers on a campaign than the appointment of a surgeon and his mates. After the fight at Breed's Hill they found it needful to establish a general hospital for the wounded from many regiments—to provide it with supplies irrespective of those at the command of regimental surgeons, and to have medical men in attendance who belonged to no regiment but to the hospital department in general. Thus there became established a small corps of staff surgeons. In a short time, as regiment after regiment from beyond the limits of Massachusetts joined the army at Cambridge, the necessity for the adoption of some system of organization became manifest. Most of the regiments brought medical officers with them, but few were supplied with the needful stores and medical supplies. A bill was adopted providing for a director-general whose duties were to furnish bedding, medicines, and all other necessities; to pay for the same, superintend the whole and make his report to and receive orders from the commander-in-chief; four surgeons, one apothecary, twenty mates, a clerk, two store-keepers, and a nurse to every ten patients. Congress appointed the director-general, who was authorized to appoint the surgeons,

and these in their turn selected their mates. Shortly after his appointment, the first director-general, Dr. Benjamin Church, was accused of treasonable practices. A letter in cipher, giving full information concerning the strength and position of the Continental troops, was attributed to him. The doctor acknowledged its authorship, but claimed that his intention was to impress the enemy with such an idea of our superiority as to prevent an attack at a time when we were out of ammunition. The court found him guilty and referred the case to Congress for punishment. After a confinement of some months his health failed and he was set at liberty under bonds to appear for trial when called. He sailed shortly afterwards for the West Indies, and the vessel is supposed to have foundered at sea, for she was never heard of again.

Church's successor, Dr. John Morgan, labored earnestly to keep the army supplied with stores for its sick; but the difficulty of his task may be appreciated when it is observed that he had to make an appeal to the "Publick." In September, 1775, a congressional committee was appointed "to devise ways and means for supplying the army with medicines"; but it did little to overcome the difficulty. Ultimately it was realized that a director-general with the army could not satisfactorily perform the duties of a purveyor in the larger cities, and it was decided to appoint a druggist in Philadelphia "whose business it shall be to receive and deliver all medicines, etc."; but the director-general was not thereby relieved of the duty of seeing that this work was satisfactorily performed.

Besides the hospital at Cambridge, one was established at Ticonderoga for General Schuyler's command, and, in 1776, a third at Williamsburg, Va. The position of surgeon at this time was no sinecure, for small-pox, typhus and typhoid fevers, diarrhoea and dysentery, were rife in the Continental armies. The army at Cambridge in September, 1775, consisted of 19,365 men, of whom 2817, or 14.5 per cent., were sick, present or absent; and in December the number taken sick weekly was from 675 to 1500, one-third of whom had to be sent to the small-pox hospitals.

The general hospital system having been extended beyond the one hospital originally established at Cambridge, an act was passed allowing one surgeon and five mates to every 5000 men, with such other assistance as might be necessary. Certain of the provisions of this bill aroused a strong feeling on the part of the regimental surgeons against the hospital surgeons. It provided that the former should carry only medicines and instruments, and that when a man became so sick as to require medical stores he should be sent to hospital for treatment. The regimental surgeons claimed that they were thus subordinated too much to their comrades of the hospital. They had less rank and less pay than these, and now their stores and their sick were taken away, leaving them only the trifling ailments of camp to attend to. They claimed the right to take care of their own sick, and they were supported in this by a majority of the regimental and company officers; moreover, the hospitals were not prepared to take charge of the large number of cases that would have been turned over to them at this time, and it was feared that an outbreak of typhus would be the result of attempting to overcrowd. A compromise was therefore effected by introducing the sys-

tem of hospital fund which exists in our army to the present time. The rations of the sick were to be commuted by the commissary of subsistence, and needful articles purchased with the money. In this way certain of the sick could be provided with hospital stores and treated in camp, the hospitals be relieved and the regimental surgeons in some measure satisfied.

At this time the suffering for want of medical supplies in the northern army was attracting general attention. Letters from the troops were filled with complaints. There was not in the army enough of lint to dress the wounds of fifty men, not a dose of cinchona although malarial fevers were of frequent occurrence, nor any bedding, not even straw for the sick, who lay on the bare boards of the hospital floor. The country expected something to be done to remedy this deplorable state of affairs. Director-General Morgan had done all in his power apparently to relieve the necessities of this army. All his surplus stores had been sent to it, but there was delay in their arrival, in fact for some time during their transportation they were to all intents and purposes lost,—neither those who sent them nor those who wanted them being able to hear anything of their whereabouts. Regimental surgeons held the hospital surgeons responsible for this destitution, claiming that everything was kept in hospital for an emergency that might not occur, while men were dying by the hundred with their regiments. At this time also it unfortunately happened that a dispute arose as to rank between the director of this army, Dr. Stringer, and the director-general. The latter in sending supplies at Stringer's request had also sent some surgeons, and the appointment of these had been regarded by the director as an infringement of his rights. Accordingly, when Stringer was sent by his commanding general to New York to hurry up supplies, he took the opportunity of going to Philadelphia to represent his grievances to Congress. He contended that he was not subordinate in his directorship, while Morgan, on whom this contention seems to have been forced, held that there was but one General Hospital, though consisting of several divisions each under a separate director, and but one head, the director-general. Stringer was supported in his attack on Morgan by the influence of the regimental surgeons, who bore the latter a grudge for building up the general hospital system at their expense. Meanwhile a congressional committee which had been investigating the condition of the northern army, made its report, and a resolution was adopted that "Dr. John Morgan, director-general, and Dr. Samuel Stringer, director of the hospital in the northern army of the United States be, and they are hereby, dismissed from any further service in said offices." Congress appeared to consider the contention as to rank, as the root of all the troubles, whereas it really lay deeper and was wholly independent of this; and in summarily disposing of the case in this manner it did an injustice to the director-general which was in part atoned for later. About a year after his dismissal he succeeded in having a congressional inquiry into his conduct of affairs which approved him as able and faithful in the discharge of his duties, and a resolution was passed to that effect; but he was not reinstated. He retired to private life, disappointed, and died not long after.

In 1777, after Morgan's dismissal, the Army Medical Committee of Con-

gress reported a bill for the establishment of a Medical Department, which had been drawn up by Dr. Wm. Shippen and Dr. Jno. Cochran. This was an elaborate affair, based on the organization of the British service and accepted because it was so, for, as Washington said: "The number of officers mentioned in the enclosed plan, I presume, are necessary for us, because they are found so in the British hospitals." Shippen was appointed director-general. The bill provided also for a deputy director-general, a physician-general, a surgeon-general, and an apothecary-general for each of the departments; an assistant deputy director and a commissary for each of the hospitals; senior physicians and surgeons, second surgeons, mates, stewards, matrons and nurses; also for a physician and surgeon-general for each army, to have control over the regimental surgeons and their mates. This unwieldy establishment, which had been built up gradually through a long series of years in a country where rank and class distinctions had a prominence that was not to be found in the colonies, was accepted as the only solution of a problem which had been proved to be one of infinite difficulty. Experience during the remaining years of the War of the Revolution simplified the organization by removing its functionaries with the high sounding titles; and there seems no reason to doubt that had a little longer time been given, the establishment would have been resolved into a corps of surgeons and assistants taking rank in their grade by seniority and assigned to duty in accordance with their rank.

In 1777 most of the hospitals were not only deficient in supplies but crowded with men who were prevented from going to the front merely because they were unprovided with shoes, clothing and blankets. A general complaint was raised, and Dr. Benjamin Rush, physician-general of the hospital of the Middle Department, did not hesitate to attribute the destitution of the hospitals to the mismanagement of the director-general. As a partial remedy for this state of affairs the deputy director-general of each department was relieved from all other duties except that of purveying; and as the influence of British institutions was still at work in the elaboration of the organization, each of these was provided with a deputy to aid him in his work. The deposed director-general, Morgan, joined forces with Rush in endeavoring to throw discredit on Shippen's work, with the result of bringing him to trial; but the court exonerated him and Congress approved its findings, and in 1780, when the Medical Committee reported a bill to simplify the cumbersome organization, Shippen retained the director-generalship; but he resigned soon after and was succeeded by Cochran. The bill provided for the director-general, a chief physician for the hospitals of each department, and one for each separate army, and a purveyor for the whole. Promotion by seniority was authorized next year,—and the Medical Department was getting into excellent working condition when prospects of peace put an end to further progress. Officers were mustered out and furloughed, so that in 1784 the army of the United States consisted merely of some detachments of artillerymen who guarded stores at Fort Pitt and West Point.

For some years subsequent to the close of the War of the Revolution the army of the United States consisted of troops enlisted for short periods

of service, with no provision for medical service other than that afforded by regimental medical officers.

In 1798 quite a formidable force was raised in anticipation of trouble with France, and on the recommendation of Secretary McHenry, who had been a surgeon during the Revolution, a hospital establishment based on the later experiences of the war, was authorized; but the war clouds became dissipated and this measure never went into practice.

In 1802 a new departure was taken in appointing army medical officers. The army at that time was so small that the few surgeons and mates provided on a regimental basis were wholly incapable of attending to the sick, scattered as they were at various posts along the frontier; medical officers were therefore appointed to garrisons and posts and not to corps, as heretofore. The act of March 16th allowed two surgeons and twenty-five mates as the peace or permanent garrison establishment. Additional troops levied in an emergency brought with them their regimental surgeons, and, if the needs of the service required the establishment of general hospitals, hospital surgeons of higher grade and rates of pay than the regular garrison surgeons were appointed temporarily. In this manner the Medical Department was enlarged to meet the necessities of the army in 1812.

There was, however, no provision made for a chief of the department until March, 1813, when Dr. James Tilton, who had been a hospital surgeon during the Revolution, was appointed physician and surgeon-general. His management of affairs during the war appears to have given universal satisfaction. Many hospitals were established and broken up in the progress of events, but all were well kept, fully provided with necessaries and competent for all the work thrown upon them. Some, indeed, as that at Burlington, Vermont, under the superintendence of Surgeon Lovell, of the 9th Infantry, appear from the reports to have been model establishments. The regulations of these are extant and it is readily seen that their high character was due to efficient administration, discipline and cleanliness. During the Revolution Congress kept a special committee in constant session on the organization and needs of the Medical Department. During the War of 1812 the only legislation materially affecting the department was a much needed increase of pay for the regimental medical officers. These two facts alone suffice to indicate the excellence of Dr. Tilton's administration. He returned to private life in 1815, when Congress fixed the peace establishment of the army at 10,000 men with a proportionally reduced staff of medical officers.

In 1818 a bill which organized the general staff gave to the Medical Department for the first time in its history a permanent chief under the title of "Surgeon-General." The "Director-General" of the Revolutionary period and the "Physician and Surgeon-General" of 1813 were temporary appointments to meet the emergencies of the times, but the surgeon-generalcy now authorized, and to which Surgeon Joseph Lovell was promoted on account of his excellent record, was a permanent position on the military staff of the country. The same bill provided two assistant surgeons-general, one for each of the divisions, but these, from the duties prescribed for them, should rather have been called medical inspectors. Hospital and



garrison surgeons became consolidated under the title of post surgeons, and as these took rank after the surgeons of regiments, certain of the hospital surgeons who had served in high positions on important occasions had reason to be dissatisfied with the inferior status to which they were consigned by this arrangement.

The Medical Department was fortunate in having so able a man as Dr. Lovell appointed as its chief. He defined the duties of his subordinates, established an excellent system of accountability for property, revised and improved the character of the medical reports rendered, inspired his officers with the idea that as sanitary officers they had greater responsibilities than mere practicing physicians and surgeons, and labored earnestly to have their pay increased and their official status raised in proportion to his views of the importance of their duties. He also established an equitable system of exchange of posts or stations, so that one officer might not be retained unduly at an undesirable station.

In 1821 the finishing touches were given to the organization of the department by doing away with the unnecessary positions of assistant surgeons-general and apothecary-general, and consolidating the regimental surgeons with the general staff, so that the corps consisted simply of one surgeon-general, eight surgeons with the compensation of regimental surgeons, and forty-five assistant surgeons with the compensation of post surgeons; but as this number was insufficient to provide one medical officer to each of the military posts, the system of employing civil physicians on contract was instituted.

No great event occurred during the administration of Surgeon-General Lovell; but he kept the department in a high state of efficiency, so that when cholera appeared among the troops during the Black Hawk campaign of 1832, and when the Seminole outbreak took place toward the close of 1835, nothing was lacking for the care, comfort and professional treatment of the sick and wounded. He died in 1836, and a memorial in the Congressional Cemetery at Washington, erected by the medical officers of the army, expresses their appreciation of his high qualities of mind and heart. The senior surgeon, Thomas Lawson, then serving with the troops in Florida, succeeded to the surgeon-generalcy.

Little of general interest occurred during the next ten years. The most important papers filed during this period were arguments, opinions and decisions on points connected with uniforms, rank and precedence of medical officers and their right to enter into private practice in the vicinity of their stations. At last the concentration of troops on the Rio Grande and the probability of war with Mexico led to radical change in the character of the reports and papers received at the surgeon-general's office. The needs of the time occasioned an addition of two surgeons and twelve assistant surgeons to the medical staff, and ten new regiments were enlisted, each provided with a surgeon and two assistants. These were intended to be merely provisional appointments to be vacated by the incumbents when their services were no longer required at the close of the war. Ultimately, however, not only were the staff appointments made permanent, but ten additional assistants were authorized on account of the increasing

needs of the department after the acquisition of California and New Mexico.

During the Mexican War the senior surgeons were assigned as medical directors and in charge of general hospitals; certain of the juniors were on duty at the hospitals and purveying depots and the others in the field as regimental officers with the regular troops; volunteer surgeons were on duty with their regiments with occasional details for duty in the hospitals. The surgeon-general left his office and took the field with General Scott that he might better superintend the operations of his department. General hospitals were established at New Orleans and Baton Rouge, La., at Point Isabel, Matamoras, Camargo and Monterey, at Vera Cruz, Plan del Rio, Jalapa and other points *en route* to the City of Mexico, and lastly, in that city itself. There was much sickness during the invasion. Diarrhoea, dysentery and remittent fevers were the prominent diseases. These were attributed to exposures on the plateaus immediately after the march across the *tierra caliente*, where, on account of the heat, the troops, many of them raw, had thrown away their overcoats and blankets, and had not been able to replace them. Moreover, many of the commands had become infected with yellow fever while at Vera Cruz. Nevertheless the hospital service was competent to the care of all cases, and every official report that was rendered commented on the excellent management of the Medical Department. "The Medical Staff," said General Taylor after the battle of Buena Vista, "under the able direction of Assistant Surgeon Hitchcock, were assiduous in their attentions to the wounded upon the field and in their careful removal to the rear. Both in these respects, and in the subsequent organization and service of the hospitals, the administration of this department was everything that could be wished." The surgeon-general gained the rank of brigadier-general by brevet and other medical officers seem to have earned brevets although they did not receive them. Every subordinate commander had something to say in his reports of the ability, energy and courage of the members of the medical staff on duty with his command. The intrepidity with which they exposed themselves on the field gained them special mention after every battle. Some of them, indeed, were over gallant, and exposed themselves outside of the line of their duty. Thus, General Wool noted the gallantry of Assistant Surgeon Prevost, whom he took for a newly arrived staff officer and addressed as captain, making use of him in rallying the flying troops and in bringing up the Mississippi and Tennessee regiments to charge the enemy under most trying circumstances. This was commendable service on the part of this young officer, as the conditions were special and urgent and affected the well-being of the whole army; but the same cannot be said of the action of Assistant Surgeon Roberts, who left his wounded to the care of the steward and nurses to take the place of a disabled company officer in the attack on Molino del Rey, and was mortally wounded while leading the company. In encounters with Indians in earlier and later times medical officers have been frequently called upon to engage as combatants until the time of general danger was over, because the loss of the field in such a case meant the slaughter of every wounded man; but the sacrifice of his life by Dr. Roberts seems

to have been wholly uncalled for by the conditions of the moment. Lastly, at Puebla, when 800 of our troops with 1500 sick in the hospitals were besieged for thirty days by Santa Anna, those of the invalids who were able to bear arms were organized by Surgeon Madison Mills and contributed materially to the defense. The war with Mexico was as brilliant a series of victories for the medical staff in overcoming the difficulties of the environment and caring tenderly for their sick and wounded as it was for the invading columns of our small army.

The additions to the numerical force of the Medical Department during and after the Mexican War proved insufficient for the needs of our scattered army; but although the surgeon-general repeatedly called attention to his necessities, it was not until 1856 that an increase of four surgeons and eight assistants was authorized. The same bill provided for the enlistment of hospital stewards with the rank, pay and emoluments of sergeants of ordnance, and gave extra duty pay to the men detailed as cooks and nurses in the post hospitals. Up to this time the steward had been merely a detailed man, and it not unfrequently happened that after a medical officer had spent much time and labor in educating one and instructing him in his special duties, his work would be lost by the return of the man to his company. Extra duty pay had been allowed to hospital attendants from 1819, but a ruling of the Treasury Department had deprived them of it and rendered necessary the clause relating to it in this bill.

The Utah expedition of 1857 found the Medical Department fully prepared for any emergency, but no general hospital was established, as the regimental hospitals sufficed for the care of the sick.

Surgeon-General Lawson died of apoplexy in 1861, after a service of forty years, during thirty-four of which he had been chief of the department. To his earnestness of purpose and untiring energy the medical officers of the army owed much of the recognition which they had obtained from Congress. He was succeeded by Dr. Clement A. Finley, then the senior surgeon on the army list.

Just before the death of Surgeon-General Lawson the Civil War had been opened by the attack on Fort Sumter; and from the calls for large bodies of troops issued by the President, and the feeling north and south that a desperate struggle was before the country, it was evident that without large reinforcements the Medical Department would be incapable of carrying on successfully its share of the work. At this time it consisted of one surgeon-general with the rank of colonel, thirty surgeons with the rank of major, and eighty-three assistants with the rank of lieutenant for the first five years of their service and that of captain until subsequent promotion. Three of these surgeons and twenty-one assistants resigned "to go South," and three assistants were dismissed for disloyalty. In August, 1861, ten additional surgeons and twenty assistants were authorized, and a corps of medical cadets was formed, not to exceed fifty in number, to be employed under the direction of medical officers as dressers in hospital. Some of the members of this corps did excellent service, but as a whole it was numerically too small to make itself felt as a power for good.

The medical staff of the regular establishment was speedily assigned to

duty in connection with the preparations for the coming struggle. Some took charge as medical directors of the corps and armies that were formed, instructing the volunteer officers in the duties of camp, and organizing them by brigades for hospital and battle-field service; others acted as medical inspectors, aiding the directors in their work of supervision and education; some organized general hospitals for the sick that had to be provided for on every move of the army, while others kept these hospitals and the armies in the field supplied with medicines, hospital stores, furniture, bedding, and surgical supplies; the remainder were assigned to field service with the regular regiments and batteries.

Each volunteer regiment brought with it a surgeon and an assistant (afterwards two assistants) appointed by the Governor of the State after examination by a State medical board. The efficiency of this service was further guarded by a central board for the reëxamination of any regimental medical officer whose professional competency had been called in question. The senior surgeon of each brigade became invested with authority as on the staff of the brigade commander; but as seniority was determined by a few days or weeks at furthest, it often happened that the best man for the position was not rendered available by this method. Congress therefore authorized a corps of brigade surgeons who were examined for position by the board then in session for officers of the regular corps. One hundred and ten of these brigade surgeons were commissioned.

In April, 1862, a bill was passed by Congress to meet the pressing needs of the Medical Department. This gave the regular army an addition of ten surgeons, ten assistants, twenty medical cadets and as many hospital stewards as the surgeon-general might deem necessary; and it provided for a temporary increase in the rank of those officers who were holding positions of great responsibility. It gave the surgeon-general the rank, pay and emoluments of a brigadier-general; it provided for an assistant surgeon-general and a medical inspector-general of hospitals, each with the rank, etc., of a colonel of cavalry, and for eight medical inspectors with the rank of lieutenant-colonel. These original vacancies were filled by the President by selection from the army medical officers and the brigade surgeons of the volunteer forces, having regard to qualifications only instead of to seniority or previous rank. At the termination of their service in these positions medical officers of the regular force were to revert to their former status in their own corps with such promotion as they were properly entitled to. About the time of this enactment Surgeon-General Finley was retired at his own request after forty years service and Assistant Surgeon Wm. A. Hammond was appointed the first surgeon-general with the rank of brigadier-general. In December following eight more inspectors were added. Their duties were to supervise all that related to the sanitary condition of the army, whether in transports, quarters or camps, as well as the hygiene, police, discipline and efficiency of field and general hospitals; to see that all regulations for protecting the health of the troops, and for the careful treatment of the sick and wounded, were duly observed; to examine into the condition of supplies, and the accuracy of medical, sanitary, statistical, military and property records and accounts of the Medical Department; to in-

investigate the causes of disease and the methods of prevention; they were required also to be familiar with the regulations of the Subsistence Department in all that related to the hospitals, and to see that the hospital fund was judiciously applied; finally, they reported on the efficiency of medical officers, and were authorized to discharge men from service on account of disability.

Shortly after this the corps of brigade surgeons was reorganized to give them a position on the general staff similar to that of the army medical officer, and render their services available to the surgeon-general at any point where they might be most needed irrespective of regimental or brigade organizations. They henceforth became known as the "Corps of Surgeons and Assistant Surgeons of Volunteers"; and the appointment of forty surgeons and one hundred and twenty assistants was authorized.

Promotion or increased rank is the reward in the military service for duty well performed; but little incentive of this kind was offered to medical officers during the War of the Rebellion. Many who entered as surgeons had no promotion to look forward to; and they saw their comrades of the line, formerly their equals or inferiors in rank, mount upwards step by step while there remained to them nothing but the reward of a good conscience. The sixteen lieutenant-colonelcies held by the medical inspectors offered no chance of promotion to the vast number of those who looked up to them. Surgeon-General Hammond made several efforts to obtain increased rank for the medical directors of armies. That a medical officer on duty as medical director held only the rank of major, although responsible for the work of five or six hundred officers, one-third of whom had a rank equal to his own, seemed an oversight that required only to be pointed out to be immediately remedied,—the more so that the corresponding officers of the Adjutant General's, the Quartermaster's and Subsistence Departments, were assigned to their duties as colonels; yet the efforts of the surgeon-general were met by a curt refusal on the ground that the skill and efficiency of surgeons were not dependent upon rank and pay. The reply was to the effect that surgical ability was not in question; that the duties of a medical director were purely administrative, and that for the proper performance of such duties rank was essential; but no action was taken upon this subject until towards the close of the war, when Congress recognized the responsibilities of these officers by giving the rank of lieutenant-colonel to the director of a corps and of colonel to that of an army.

It is seen, therefore, that during this great war the work of the Medical Department was performed by the regular medical officers and the corps of volunteer surgeons and assistant surgeons, both commissioned by the President, and by the large body of regimental medical officers commissioned by the Governors of States. In addition to these, civil physicians, known as acting assistant surgeons, were employed under contract, mostly in the wards of the general hospitals established in the vicinity of the national capitol and many of the large cities. Just before the close of the war another class of medical officers was authorized. Regimental surgeons whose regiments had been mustered out on account of the expiration of their terms of service were offered the position of acting staff surgeons as

an inducement for them to continue in service; and a few were thus led to return, for assignment in the field or base hospitals. The ambulance corps must also be mentioned as a part of the machinery of the Medical Department. An ambulance service consisting of men specially enlisted and under the command of medical officers was urged by General Hammond, but no action was taken at the time on his suggestion. Somewhat later, however, a corps was organized from detailed men, with lieutenants as brigade and division officers, and a captain on the staff of the commanding general as chief of ambulances of the army corps. These officers were practically acting quartermasters for the Medical Department so far as related to the transportation of the sick and wounded.

In 1864 Surgeon-General Hammond was tried by court-martial and dismissed from the service on account of disorders and neglects in relation to the purchase of blankets, medicines and medical stores of inferior quality. General Hammond contended that the law authorized him not only to indicate to medical purveyors what and where they should purchase, but even to send the order himself, particularly under the emergency calls of a great war, and that in none of the specified instances had he been actuated by any motive other than that of performing the important duties of his office with credit to himself and benefit to the invalids who depended on his department for their care and comfort. Nevertheless, the proceedings were approved August 18, 1864, and Medical Inspector-General J. K. Barnes, who had been acting surgeon-general pending the trial, was appointed to the vacancy. It is scarcely needful, so far as General Hammond is concerned, to say that this sentence has been annulled and set aside. Fourteen years after it was promulgated he came before Congress for relief. The Senate Military Committee in its report reviewed the case and the history of the times, showing how there came to be a want of cordiality between the Secretary of War and the surgeon-general, and that, in consequence, the weaker went to the wall. The bill which replaced his name on the Army Register was approved March 18, 1878.

In the early period of the war the unit of organization for field work was the regimental hospital, but the advantages of consolidation became speedily manifest. When the sick exceeded the capacity of the regimental accommodation, brigade hospitals were established to receive the overflow and obviate the necessity for sending temporarily disabled soldiers to distant general hospitals. After a battle the coöperative work of the surgeons of a brigade was found to give infinitely better results than could be obtained by preserving the individuality of the regimental hospitals. A larger experience of these advantages led to the consolidation of the brigade hospitals of a division for administrative purposes into a field hospital for the division. These worked so well in the Western Army, and in the Army of the Potomac during the battle of Antietam, that thereafter orders were published calling for their establishment as soon as an engagement was imminent. A medical officer was assigned to the command of the division hospitals; assistants were detailed to provide food and shelter and keep the records, and the best surgeons of each brigade were assigned to duty at the operating tables. Those officers who were not required for



special service in the hospital accompanied their commands into action and established dressing stations at convenient points in rear of the line of battle where the wounded were prepared for transportation by the ambulances of the hospital. At the beginning of a campaign a standing order was promulgated by the medical director detailing his medical officers to their various duties in case of an engagement. The chief of the hospital and his assistants were permanent details, sometimes staff instead of regimental surgeons. They remained at all times with the ambulances on the march and in camp. When a line of battle was formed, a suitable site was selected to which the ambulance train brought up the tents and supplies for the establishment of the hospital, and the ambulance officers proceeded to the dressing stations to bring in the wounded. The success of this field hospital system was such that in many commands its existence was continued during the period of inactivity in winter quarters, only trivial ailments being treated in camp by the regimental medical officers, whose medical knapsacks were replenished from time to time from the supplies of the hospital. When established on the battle-field the objects of the division hospital were to give shelter and surgical care, with time and facilities for the performance of all needful primary operations. As soon as this work was accomplished the wounded were sent to the base of supplies in ambulance or other available wagons of the Quartermaster, Subsistence or Ordnance Department, and from this they were shipped by rail or steamboat to northern cities where ample accommodation and comforts were provided in the magnificent system of general hospitals which had been established.

At first the Medical Department labored under considerable disadvantage on account of its dependence on the Quartermaster Department for its transportation in the field, and by sea and rail, as well as for its hospital buildings; but in progress of time these difficulties became smoothed over by the organization of the ambulance corps for the field transportation of the wounded, and the building of special hospitals and hospital steamers which were placed under the orders of the Medical Department. The extent of the provision for the care and treatment of the sick and wounded may be appreciated when it is observed that in December, 1864, there were in the general hospital of the North 118,057 beds, 34,648 of which were unoccupied and ready for the accommodation of those who might be disabled at any time in the progress of events on the theatre of war. During the war there were reported on the monthly reports of medical officers 6,454,834 cases of sickness and injury, 195,627 of which were fatal. Of the diseases, diarrhoea and dysentery, fevers of a typhoid character and pneumonia were the most prevalent and fatal.

Medical and hospital supplies for all these cases were provided mainly from the purveying depot in New York City in charge of Surgeon R. S. Satterlee, whose honorable record extended from the Florida and Mexican wars to this important duty during the Civil War. Supplies were also purchased in Philadelphia and to some extent in Chicago, St. Louis, Cincinnati, etc. The expenditures on behalf of the Medical Department in 1861-1866 amounted to 48 million dollars.

The museum and library of the Surgeon-General's Office, both of which



have now a world-wide reputation, had their beginnings during the war. Surgeon-General Hammond, in a circular in May, 1862, announced the intention of establishing an Army Medical Museum, and requested medical officers to collect specimens of morbid anatomy, medical and surgical, which might be regarded as valuable, together with projectiles or foreign bodies removed, and such other matters as might prove of interest in the study of military medicine and surgery. Later circulars gave more specific instructions regarding the collections to be made. For a number of years the museum was installed in the old theatre building in which President Lincoln was assassinated, but recently a handsome and commodious building has been erected in the Smithsonian grounds at Washington, D. C., where are now aggregated over 31,000 specimens, two-thirds of which are anatomical and pathological and the remainder microscopical, with, in the library, nearly 107,000 bound volumes and 166,000 unbound theses and pamphlets. Congress has provided for the publication of an index catalogue of the library, thirteen volumes of which have been published, bringing the work nearly to the end of the letter S. This catalogue, the work of Major John S. Billings, has given a marvellous impetus to medical literature and education in this country, as it places the valuable stores of the library within easy reach of those who are qualified to make use of them. The original intention was to have the library and museum connected with a hospital and medical school for the special training of those intended for the medical service of the army, but since the war the military force of the country has been too small to warrant the support of an institution of this kind. The library and museum have, however, taken a higher position than that originally intended, for they are now regarded as belonging to the medical profession of the country and not to any special school, hospital or section. Another of the notable results of the war is the "Medical and Surgical History of the War of the Rebellion." The six large quarto volumes of this work were published at various times from 1870 to 1888, when the last was issued. These volumes show that while the work of the Medical Department, in field and hospital, was carefully performed as regards the individual case, the necessary reports and papers were fortunately not forgotten. Some volunteer surgeons who took pride in considering themselves practical men, because they gave but little care to what they were pleased to term the red-tapeism of the department in calling for reports, have since then learned to appreciate the importance of these reports in their connection with the immense business of the Bureau of Pensions.

Secretary Stanton has put on record his testimony to the efficiency of the Medical Department during the war, not only as regards the care and comfort of the sick and wounded, but as to the accomplishment of its important duties without in any instance impeding or delaying the movements of the army. Its casualty list affords proof of the courage and zeal of its members and of their devotion to duty, for 32 were killed in battle or by guerrillas, and 83 were wounded, of whom 10 died in consequence; 9 were killed by accident; 4 died in rebel prisons, 7 of yellow fever, and 271 of disease incidental to camp life and resulting from exposure.

The latter part of the year 1865 was devoted to the breaking up of the

depots and general hospitals, and next year the Medical Department was again placed on a peace footing with a personnel consisting of a surgeon-general; an assistant surgeon-general with the rank of colonel; a chief medical purveyor and four assistants, lieutenant-colonels; sixty surgeon-majors, and one hundred and fifty assistants, captains and lieutenants. In 1872 provision was made for a chief medical purveyor with the rank of colonel; but in the meantime all promotions and appointments had been interdicted, so that the reports of the surgeon-general speak in urgent terms of the crippled condition of his department. In 1873 there were 59 vacancies, and in the following year, to meet the demands of the service, no less than 187 surgeons had to be employed on contract. At this time Congress authorized the appointment of assistant surgeons, but cut off two of the assistant medical purveyorships and ten of the sixty surgeons, prohibiting promotion until the number became thus reduced; and in 1876 the number of assistant surgeons was cut down to 125.

From the close of the War of the Rebellion the want of higher rank and corresponding increase of pay for the older officers of the corps had received a good deal of attention, and several efforts were made to give these officers a status similar to that provided for the seniors of the other staff corps. These were at last successful in 1876, when, in addition to the existing grades there were authorized four surgeons, colonels, and eight lieutenant-colonels, giving the members of the corps their present rank, viz., 1 brigadier-general, 6 colonels, 10 lieutenant-colonels, fifty majors and 125 captains and lieutenants.

For some time after this the department was crippled by the retention on the active list of members who were wholly incapacitated by reason of advanced age. Officers of the other staff corps and of the line were placed on the retired list and their places taken by younger men, but the seniors of the Medical Department were permitted to remain on nominal active service until removed by death. At last the compulsory retirement law of 1882 gave a recognizable and gratifying impetus to what had hitherto been the stagnation of promotion. Among the first removed by this law was Surgeon Jno. M. Cuyler, who had held his position on the active list for forty-eight years. Surgeon-General Joseph K. Barnes was also removed; he did not long survive his retirement, nor did his successor, General Charles H. Crane, continue long in office after him. Both these officers were for nearly twenty years associated in the management of the department, and their deaths occurred within a few months of each other. General Barnes possessed the full confidence of Secretary Stanton in all matters pertaining to the administration of the department, and to this was due the independent status of general hospitals in time of war, together with the removal of hospital transportation, both by sea and land, from any interference by other than medical authority,—two important decisions which tended much to the efficiency of the medical service during the War of the Rebellion.

General Robert Murray succeeded General Crane, and after a few years was followed by General John Moore. Dr. J. H. Baxter, who had served as a surgeon of volunteers during the war, and had entered the regular service

in 1867 as a lieutenant-colonel, filling an original vacancy as assistant medical purveyor, received the appointment on the retirement of General Moore in 1890, but he died suddenly a few weeks after his promotion and was succeeded by the present incumbent, General Charles Sutherland.

Some of our medical officers have recently raised a contention for the military title. They may possess their souls in peace. Given the rank, pay and emoluments and the titles will come because there is a need for them. The first object of the army medical officer of to-day is to preserve the health of his command. He is a sanitary officer on the staff of his commander, and it is an anomaly to give the same title to the young officer on the staff of a captain in command of a one-company post and to the veteran of forty years experience on the staff of the division commander. Even our older medical officers, who have a fondness for the title of doctor because they have borne it all their lives, begin to recognize that they are colonels in the Medical Department, when seated at their desks revolving some knotty point of policy or administration that has just been respectfully referred for their consideration. Congress has seen the necessity for giving these officers rank, pay and emoluments of colonels, etc., and the same necessity brought into official business and the ordinary intercourse of life will bring them their distinctive titles. Some ultra conservative may persist to the end in calling the medical officer "doctor," but the ultra conservative will die and the chariot of progress will roll over his bones without being in the least impeded.

During the past few years one of the greatest advancements and improvements in the practical working of the Medical Department has been effected by the addition of the Hospital Corps to the army. Formerly all the work of the department, including nursing and cooking in hospitals, and litter carrying and ambulance work in the field, was performed by men detailed from the command to which the medical officers were attached. It was difficult to obtain good men for these important duties, for company commanders oftentimes objected to the details asked for by the surgeons, and even when good men were assigned to hospital duty the frequent changes taking place in the constitution of a command would often remove them from the service of the hospital as soon as they had attained enough of experience to become really useful. The status of these men was fully recognized in the army; they received extra pay for their services, and as long ago as 1828, orders were issued exempting them from all military duties, except attendance on weekly inspections and regular musters for pay. The whole system was, however, so objectionable that medical officers frequently urged the establishment of a corps of men for special service in the hospital department. In his annual report for 1862 to the Secretary of War, the surgeon-general suggested the establishment of such a corps. Again in 1885 a similar recommendation was made, and this time with effect, for a bill, approved March 1, 1887, provided that the Hospital Corps of the United States Army should consist of hospital stewards, acting hospital stewards and privates, and directed that all necessary hospital services in garrisons, camp or field, including ambulance service, should be performed by its members. The regulations prescribed under the terms of the law provided for the education

of four men from each company in litter drill and first aid to the wounded. These men, called company bearers, are intended to act in emergencies until relieved by the regular members of the Hospital Corps. Provision was made for the enlistment of intelligent men from civil life into the corps, and for the organization of companies of instruction in which the training of the men in all the details of hospital service as cooks, nurses, attendants, litter-bearers, etc., is perfected under the supervision of the medical officers. Certain of these men are selected for assignment as acting hospital stewards after an examination to determine their proficiency in pharmacy, materia medica and the management of medical and surgical emergencies; and after a year, at least, of service and a further examination on these subjects, together with minor surgery and the elements of practical sanitation, they are eligible for promotion to the position of hospital steward.

The advantage of this organization and training has been demonstrated on several occasions during the past few years. The corps consists at present of 130 hospital stewards, 100 acting hospital stewards and 600 privates. The hospital stewards of the army were originally appointed to take charge of hospital stores, furniture and supplies for the sick, and to receive and distribute rations at hospitals; but as no pharmacist was provided for hospitals, the duty of making up prescriptions and having general charge of the sick in the absence of the medical officers fell to the lot of the hospital steward, and came by degrees to be regarded as his most important work. The recent law gives him his proper status and a corresponding increase of pay.

The perfection of the corps by enlistment of the best material would enable the Medical Department not only to meet all the requirements of its existing service, but to expand with the requirements of an emergency to supply the needs of an army many times the size of that now authorized. If the act which established it be examined it will be found that the corps is intended to be what all military organizations ought to be, a training school for war service; and its efficiency as such depends, of course, on the ability and energy of the officers and the intelligence and interest of the men. Intelligence is required on the part of the latter not only to understand but to teach; for the system adopted involves transmissions of knowledge from those who have been advanced, to those who have been accepted from the ranks to fill the vacated positions. The acquirement of information bearing on the management of sick and wounded, and the methods of turning such information to practical account when called for by the requirements of the occasion, are the objectives of the corps; and their pursuit, as may be readily appreciated, tends as well to prepare the hospital establishment for efficient service in the undesired event of war as to perfect it in the discharge of its current work. When every acting hospital steward is qualified to undertake the duties of steward, and the private of the corps in general ready to step into a higher position, the expansion of the corps in an emergency can be effected by recruiting merely for the last mentioned grade. Only in the event of a great war calling for the strength of the States to take the field would the system fail for want of men qualified for the positions; but this will ultimately be met, no doubt, by the assimilation of

the Medical Department of the National Guards to that of the regular forces, so that when each State regiment is mustered into the United States service it will bring with it its quota to the Hospital Corps.

In reviewing the history of the Medical Department, it seems to the writer that its officers, and those of the army as a whole, have reason to feel gratified. Having had its beginning as we have seen in the patriotism of the individual medical man, which led him to pack his saddle-bags with needful supplies for the care of his friends and neighbors who might come to grief on the road between Boston and Concord, it has evolved through the medium of experience in the Revolutionary War, in that of 1812, in the Mexican War, in campaigns innumerable against hostile Indians, and in the terrible trials of the War of the Rebellion, into a corps of officers whose members are tied down to no specific duties, but are available for assignment in an emergency to the duty which each is best qualified to undertake, and whose rank, pay and emoluments increase with their age and experience. The simplest form of organization has been shown by experience to be the best, and this that we now possess is the simplest for medico-military organization. The Hospital Corps is constituted on similarly simple lines, so that there is needed only the adoption and education of a similar corps by the State forces to enable the country to meet the probable emergencies of the future, so far as the Medical Department of the Army is concerned.

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*A delightful blend of choice selections of Turkish, Perique and Havana tobaccos with bright Virginia, prepared by an entirely new and original process, combining all the advantages of cut tobaccos with the peculiar qualities of granulated goods.....Smokes cool and sweet, and lasts as long in the pipe as cut plug. It is absolutely free of stems.*

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Put up in 2, 4, 8, and 16 oz., decorated cans.



**BLACKWELL'S**  
"Bull Durham" and  
GRANULATED

"Royal Cat's Eye"  
PLUG CUT

**TOBACCOS**

are the most honest, popular, uniform, reliable, satisfactory goods ever put upon the market. To smokers of granulated tobacco

**"BULL DURHAM"**

needs no commendation, it having been known to the officers and soldiers of the United States Army for the past 20 years.

To smokers of Plug Cut goods we are offering our

**"ROYAL CAT'S EYE,"**

a recent production, in the manufacture of which we have spared neither pains nor money to combine in it those qualities that insure a mild and delicious smoke.

One Post Commissary writes of "ROYAL CAT'S EYE,"  
"The tobacco sent is of excellent quality and gives entire satisfaction."

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Gold Medal, Germany, "Massive," 1877.

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Silver Medal, Austria, 1879.

Gold Medal, Royal Agricultural Society, London, Eng., 1879.

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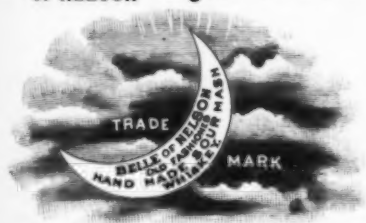
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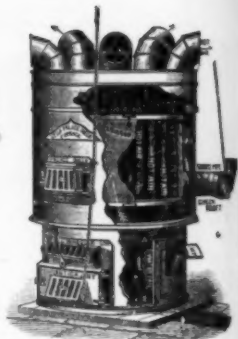
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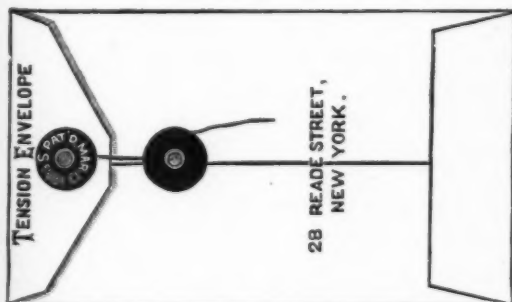
which has a firing capacity with two barrels of FIVE HUNDRED SHOTS PER MINUTE, and with four barrels ONE THOUSAND SHOTS PER MINUTE; mounted on tripod or carriage. We would call the attention of MILITARY men to this GUN, to whom we shall be pleased to furnish further information on application. Its extreme SIMPLICITY, DURABILITY, and STRENGTH, should recommend it above all others. Circulars, Illustrated Catalogues, and Price-lists sent upon application to

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Family Flour and F. S. New Process,  
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ALSO

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The best balanced Cereal Product for the rational nourishment  
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AKRON, OHIO, JULY 9, 1892.

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At two years of age she is a plump, active, healthy, happy child, and weighs twenty-six pounds, over five times her weight at birth.

Her digestion is perfect, and she usually sleeps twelve to thirteen hours every night without awakening.

Yours truly, F. A. SCHUMACHER.

After using fifty pounds of Schumacher's Infant Food I cannot speak too highly of its beneficial results. Using previously several largely advertised foods our daughter was progressing poorly, being small and puny, with no evidence of growth whatever. Within four days after we commenced using your food we noticed a marked change. Baby became active, bright, and started to grow rapidly, until now, some ten months after, she is as plump and healthy a child as can be found anywhere.

Yours gratefully,

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Offer to the Officers and Men of the U. S.  
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WARRANTED ABSOLUTELY PURE.

A TRIAL WILL CONVINCE YOU THAT  
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Some soaps are said to contain an ingredient "good for the skin." Suppose they do. Would such an application have any effect? If the soap is "good" for *anything*, should it not wash away its own elements, and leave the skin clear?

Is it not more likely that the "good for the skin" ingredient is there to conceal the odor or appearance of a poor soap?

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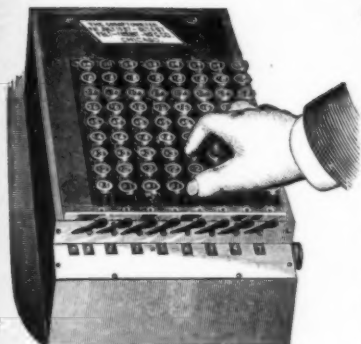
"There is no positive virtue in carbolic, tar or other medicated soaps for ordinary purposes."

Ivory Soap contains nothing, is nothing but soap—pure soap.









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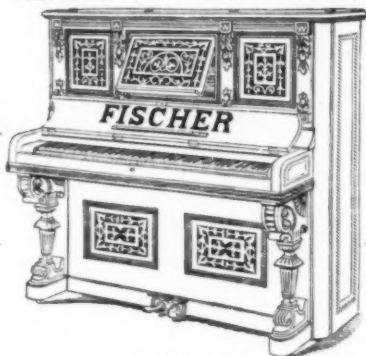
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Condensed Milk. There are cheaper  
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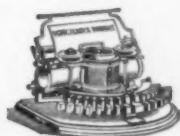
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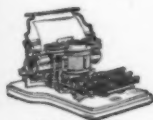
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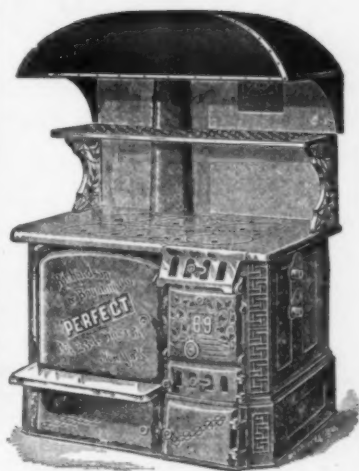
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DRAWING INSTRUMENTS AND MATERIALS OF  
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The engraving shows a modification of the simple Plane Table there being added a tangent movement in azimuth and three screws for leveling.

The board appears as cut away to show the socket and leveling screws and tangent movement by which, as will be seen, a more delicate adjustment in azimuth may be obtained.

This Plane Table complete costs \$170.00.

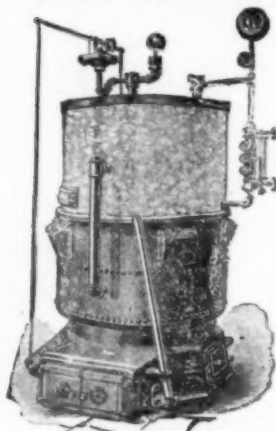
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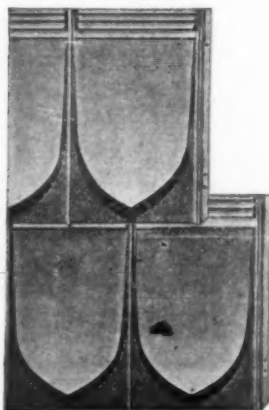
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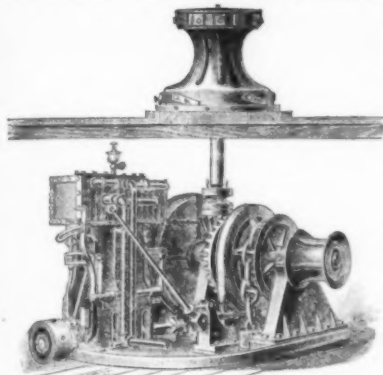
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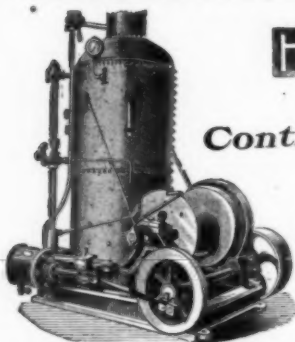
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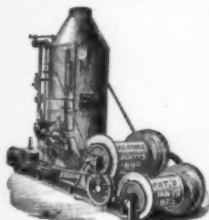
New York,	-	1878	New Orleans,	1886
New York,	-	1879	Boston,	- - 1890
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After Concert Tour, 1890.

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*My renewed and by mere use—under aggravating circumstances, as bad health and tiresome travelling—enlarged experience of your Pianos this (second and last transatlantic) season has throughout confirmed myself in the opinion I expressed last year, viz.: That sound and touch of the Knabe Pianos are more sympathetic to my ears and hands than sound and touch of any other Pianos in the United States. As I met with frequent opportunities of establishing comparisons between the Knabe Pianos and instruments of rivalising or would-rivalising producers, I dare now add that I declare them the absolutely best in America.*

*With sincere regards,  
Yours truly,  
DR. HANS VON BÜLOW.  
Hamburg, 27th May, 1890.*

Letters from  
the World's Greatest  
Pianists:

**Von Bülow**

—AND—

**D'Albert**

Both  
declare the Knabe  
the Best Pianos  
in America.

**Eugen D'Albert's Letter**

—TO—

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Translated from the German.

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**EUGEN D'ALBERT.**  
New York, May 26, 1890.